HEDY

HD700 Advanced User Manual

(0.4kW~500kW)

(V1.3)

Foreword

General information

Thank you for using HD700 AC drives made by Guangzhou HEDY Industrial Automation CO., Ltd.
This manual introduces HD700 drives parameters and advanced function in detail.
The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent, or incorrect installation or adjustment of the optional operating parameters of the equipment or from mismatching the variable speed drive with the motor.
The contents of this manual are believed to be correct at the time of printing. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the contents of the manual, without notice.
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Drive software version

This product is supplied with the latest version of software. If this product is to be used in a new or existing system with other drives, there may be some differences between their software and the software in this product. These differences may cause this product to function differently.

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1 Parameter description

1.1 Overview

HD700 drive applications are divided into three levels: quick application, the basic application and advanced application.
In order to the user quickly start the drive, HD700 drives design P00 parameters that are related to other function parameters. Changing one of P00 parameters will cause the related parameter being changed and vice versa. Menu P00 has been described in detail in the ***HD700 use manual***. To avoid a repeat, Menu P00 is not described in this advanced manual. P00 parameters are only noted behind the name of the related parameters in parentheses.
In the basic applications, the drive preset some functions. The user can use these functions by simple settings. The basic application functions meet the needs of most cases.
In the advanced applications, the user can program parameters and can select almost all parameters as source parameter or destination parameter (if the attribute of the parameter is permitted and the parameter does not conflict with other parameters settings). The drive has internal enhancement module that can realize logic operation, arithmetic operation, binary-decimal conversion, comparison operation and so on in order to meet the specific function needs of users.

1.2 Parameter attributes description

1.2.1 Parameter description format

In the following sections, descriptions are given for the advanced parameter set. With each parameter the following information block is given.

Table 1-1 Parameter description format

Parameter ID	**Parameter name (is related to P00 parameter)**				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

The top row gives the menu: parameter number and the parameter name.
Coding: The coding defines the attributes of the parameter as follows:

Table 1-2 Parameter attributes description

Coding	**Attribute**
ND	No default: When defaults are loaded, this parameter is not modified.
PT	Protected: cannot be used as a destination.
US	Users save: saved in drive EEPROM when the user initiates a parameter save.
RW	Read/write: can be written by the user.
PS	Power-down save: parameter automatically saved in drive EEPROM when the under volts (UV) trip occurs.

Range: This gives the range of the parameter and the values it can be adjusted to.
Default: The default values given are the standard drive defaults.
Change mode: to define if the parameter can be modified, and under what condition the user can change the parameter.
Run&Stop: write & read can be done at running and stopping.

Stop Only: write & read can be done only at stopping.

Actual: read only

For example:

Table 1-3 Parameter description format

P08.02	**Analogue input 1 mode (P00.05)**				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0～6				
Default	6				
Change mode	Stop Only				

P08.02: Parameter ID

Analogue input 1 mode (is related to P00.05):Parameter name

Parameter attribute: The parameter can be revised during running and stopping state and saved in drive EEPROM. The parameter cannot be a destination.

Parameter setting range: 0～6

Default value: 6

Stop Only: Means that the parameter can be revised during stopping.

1.2.2 Parameter type

There are two fundamental types of parameters in the drive, Bit parameters and Non-bit parameters.

Bit parameters are two state only (0 or 1), such as DI1 status (P09.40) and so on.

Non-bit parameters can be further broken down into Integer parameters and Enumeration type parameters.

Integer parameters are the parameters that the value of parameters can be changed continually, such as output frequency, acceleration/deceleration rate, motor rated current and so on.

Enumeration type parameters provide an option list that each option contains a function mark. Enumeration type parameters are described as selector parameters in this advanced manual. Some selector parameters have the basic and advanced application function options. The basic application function options are defined already and they are usually indicated as numbers. The advanced application function options are programmed by the user, usually given the parameter setting range.

For example, DI1 function (P09.02), when P09.02 is basic application (P09.01=0), its option list contains 16 function options. 0 to 15 each digit respectively represents a function. When P09.02 is advanced application (P09.01=1), the setting range is P01.01 to P18.08 that means the user can define any parameter (if the attribute of the parameter is permitted and the parameter does not conflict with other parameters settings) from P01.01 to P18.18 as controlled by DI1.

1.2.3 Sources and destinations

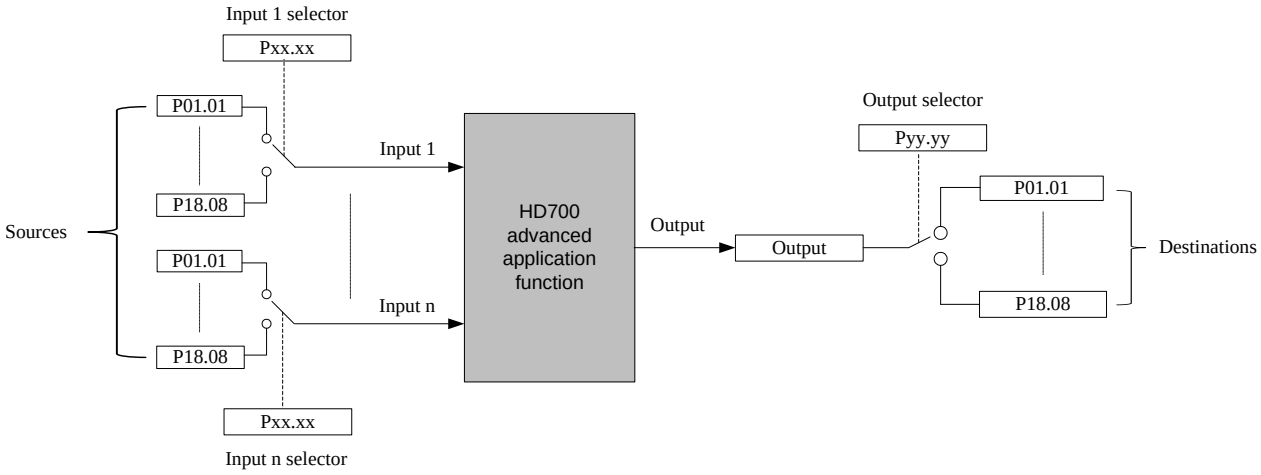


Figure 1-1 Sources and destinations

Some functions have source parameters and destination parameters in advanced applications. These parameters are respectively selected by the selector parameters.

As show in figure 1-1, input selector parameter (Pxx.xx) selects one parameter of P01.01 to P180.08 as the source parameter of the advanced application function. The value of source parameter input into the advanced application functions as the input and produce the output after processed by the advanced application functions. Output destination selector parameter (Pyy.yy) selects one parameter (if the attribute of the parameter is permitted and the parameter does not conflict with other parameters settings) of P01.01 to P18.08 as the destination parameter of the advanced application function. The output of the advanced application function is routed to the destination parameter.

Source parameters usually are the input of these functions. For example, if select AI1 (P08.17) as PID controller reference source, must set P15.01=8.17 (select P08.17 by PID reference source P15.01), and then P08.17 is the source parameter of PID reference source.

Destination parameters are the parameters controlled by these functions. For example, if select PID output as the drive frequency reference, must set P15.15=1.27 (PID output is routed to P01.27-user programmed reference by PID output destination P15.15) and P01.01=8 (reference source is the user programmed), then P01.27 is the PID destination parameter.

The input and output of all enhancement modules can be selected by the corresponding selector parameters. The selector parameters range is P00.00 (P01.01) to P18.08. It means that all parameters (if the attribute of the parameter is permitted and the parameter does not conflict with other parameters settings) can be selected as source parameters or destination parameters. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the source or destination parameter.

- If the source parameter (e.g. P00.00) does not exist then the input is taken as zero.
- The input is given by (source value x 100%) / source parameter maximum.
- If the destination parameter does not exist then the output value has no effect.
- If the destination parameter is protected then the output value has no effect.
- The function output is displayed as a percentage of the destination parameter setting range. The destination value is given by (function output ×destination parameter maximum) / 100%
- The destination parameter will not conflict with the destination parameters of other functions. For example, if set P16.07 (block 1 output function)=6.11 (P06.11 is the destination parameter of block 1), then P16.14 (block 2 output function) cannot be set to 6.11 (P06.11 cannot be selected as the destination of block 2).

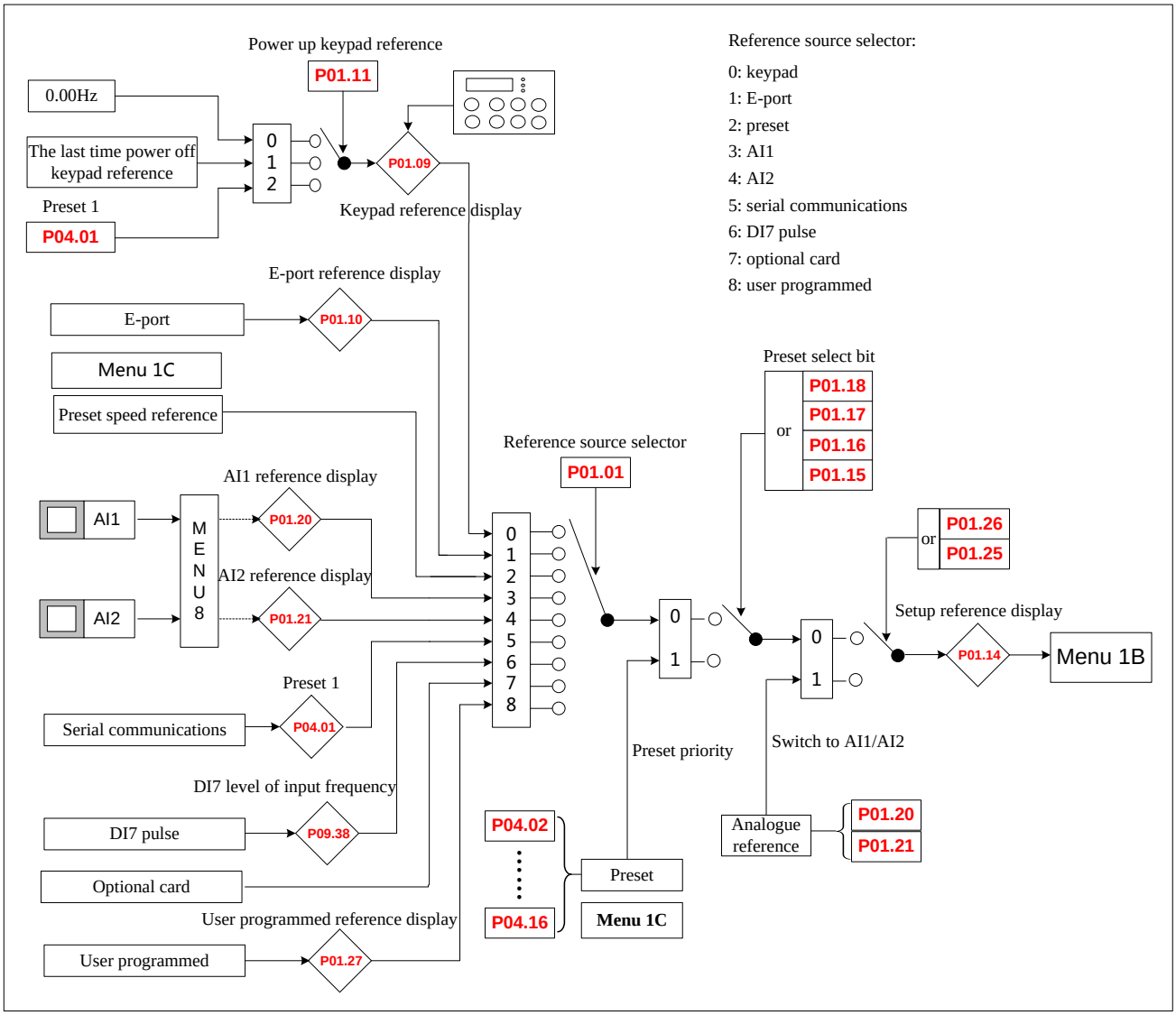
2 Parameter detailed description

2.1 Menu P01: Reference

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P01.01	Reference source selector	0: keypad 1: E-pot 2: preset 3: AI1 4: AI2 5: serial comms. 6: DI7 pulse 7: optional card 8: user programmed	1	0	Run&Stop	0064H
P01.02	Maximum frequency	0.00Hz～300.0Hz	0.01Hz	50.00Hz	Stop Only	0065H
P01.03	Minimum frequency	0.00Hz～max. frequency	0.01Hz	0.00Hz	Stop Only	0066H
P01.04	Jog frequency	0.00Hz～P01.02	0.01Hz	5.00Hz	Run&Stop	0067H
P01.05	Skip frequency1	0.00Hz～max. frequency	0.01Hz	0.00Hz	Stop Only	0068H
P01.06	Skip frequency2	0.00Hz～max. frequency	0.01Hz	0.00Hz	Stop Only	0069H
P01.07	Band of skip frequency	0.00Hz～30.00Hz	0.01Hz	0.00Hz	Stop Only	006AH
P01.08	Reserved	–	–	–	–	–
P01.09	Keypad reference display	− max. frequency～+ max. frequency	0.01Hz	Actual	Actual	006CH
P01.10	E-Pot reference display	− max. frequency～+ max. frequency	0.01Hz	Actual	Actual	006DH
P01.11	Power up Keypad reference	0: 0.00Hz 1: running reference when last power off 2: preset1	1	0	Run&Stop	006EH
P01.12	Threshold of zero speed	0.00Hz～max. frequency	0.01Hz	0.50Hz	Run&Stop	006FH
P01.13	Band of frequency arrival	0.00Hz～max. frequency	0.01Hz	2.50Hz	Run&Stop	0070H
P01.14	Setup reference display	− max. frequency～300.0Hz	0.01Hz	Actual	Actual	0071H
P01.15	Preset select bit0 status	0: on 1: off	1	Actual	Actual	0072H
P01.16	Preset select bit1 status	0: on 1: off	1	Actual	Actual	0073H
P01.17	Preset select bit2 status	0: on 1: off	1	Actual	Actual	0074H
P01.18	Preset select bit3 status	0: on 1: off	1	Actual	Actual	0075H
P01.19	Preset select indicator	Preset 1～Preset 16	1	Actual	Actual	0076H
P01.20	AI1 reference display	− max. frequency～+ max. frequency	0.01Hz	Actual	Actual	0077H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P01.21	AI2 reference display	− max. frequency～+ max. frequency	0.01Hz	Actual	Actual	0078H
P01.22	RUN/Stop indicator	0: Stop is active 1: Run is active	1	Actual	Actual	0079H
P01.23	Frequency arrival indicator	0: not arrival 1: arrival	1	Actual	Actual	007AH
P01.24	Zero speed indicator	0: none zero speed 1: at zero speed running	1	Actual	Actual	007BH
P01.25	Reference source is switched to AI1	0: off 1: on	1	Actual	Actual	007CH
P01.26	Reference source is switched to AI2	0: off 1: on	1	Actual	Actual	007DH
P01.27	User programmed reference display	− max. frequency～+ max. frequency	0.01Hz	Actual	Actual	007EH
P01.28	Output frequency detection (FDT) threshold	0.00Hz～P01.02	0.01Hz	0.00Hz	Run&Stop	007FH
P01.29	Output frequency detection (FDT) width	0.00Hz～P01.28	0.01Hz	0.00Hz	Run&Stop	0080H
P01.30	Output frequency detection (FDT) indicator	0: off 1: on	1	0	Actual	0080H

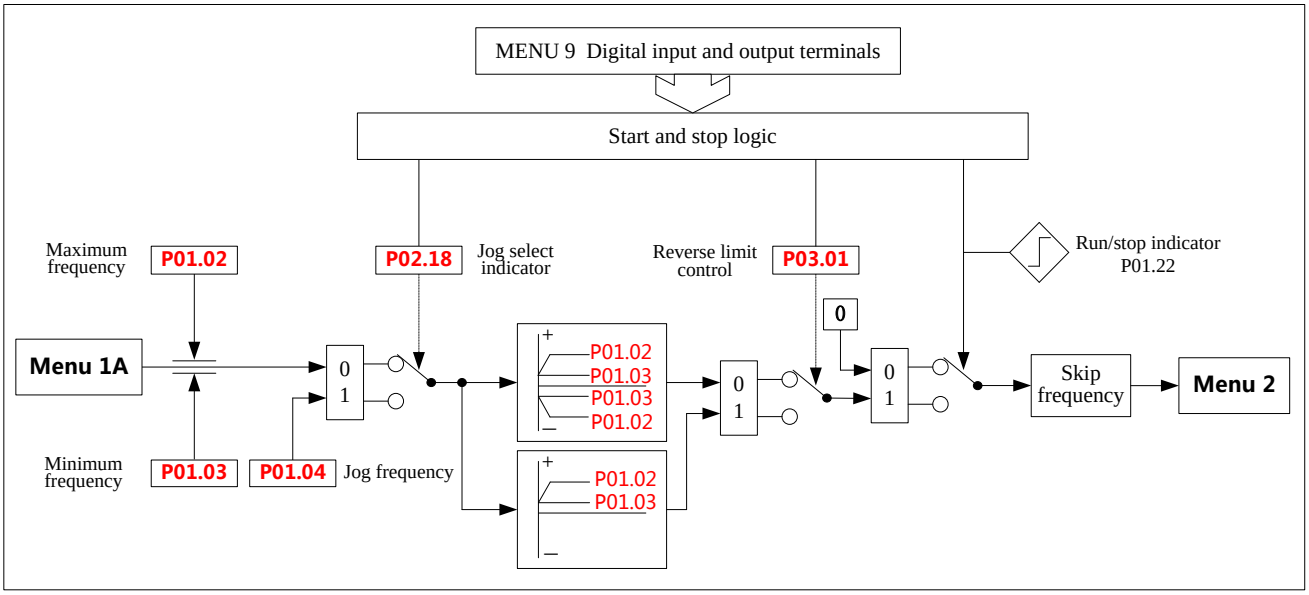
Menu 1A Logic diagram



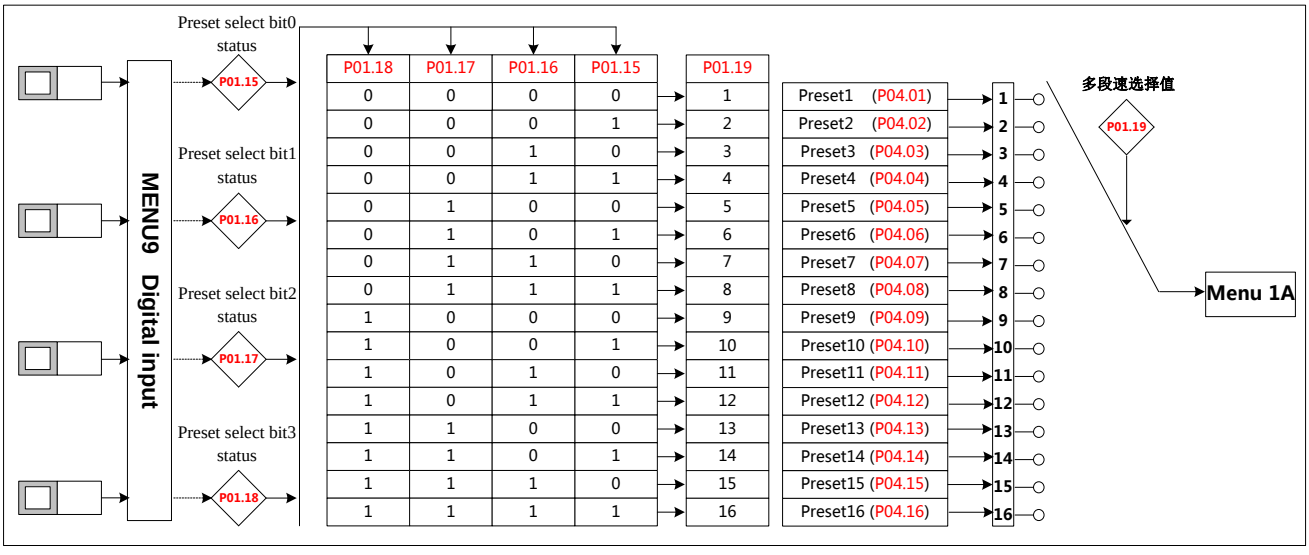
NOTE:

- P01.25 or P01.26 is valid, then the frequency switches to AI1 or AI2. If P01.25 and P01.26 both are valid, then AI1 is priority.
- When P01.25 and P01.26 both are invalid:
  - ➢ One of the preset select bits is valid, then the frequency reference switches to preset in priority.
  - ➢ Corresponding preset (preset 2 to preset 16) is selected as frequency reference.
- Switching to AI1/AI2 and preset priority both are invalid, the frequency channel selected by P01.01 is frequency reference.

Menu 1B Logic diagram



Menu 1C Logic diagram



P01.01	Reference source selector (P00.04)				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: keypad 1: E-pot 2: Preset 3: AI1 4: AI2 5: Serial comms. 6: DI7 pulse 7: optional card 8: User-programmed				
Default	0				
Change mode	Run&Stop				

0: Keypad

Through adjusting ▲ or ▼ switches to change the frequency reference, and the Power up value is decided by parameter P01.11 (P00.12).

1: E-Pot

Through the two terminals which are defined as UP, DOWN function to change the reference.

For example:

Define the DI4 and DI5 as UP and DOWN function, and the setup is as below:

P09.05=8 DI4 function is UP

P09.06=9 DI5 function is DOWN

2: Preset

Controlled by terminals, the reference is the value of P04.01 (preset 1) ～P04.16 (preset 16).

Use the default setup as an example:

P09.05=0 DI4 is preset select bit 0

P09.06=1 DI5 is preset select bit 1

There are tow operation modes:

- When the reference source is preset, terminal status as shown below:

Table 2-1-1 Preset and preset terminal status corresponding table 1

DI5 Status (bit 1)	DI4 Status (bit 0)	Speed
OFF	OFF	Preset 1 (P04.01)
OFF	ON	Preset 2 (P04.02)
ON	OFF	Preset 3 (P04.03)
ON	ON	Preset 4 (P04.04)

- When the reference source is not preset, terminal status as shown below:

Table 2-1-2 Preset and preset terminal status corresponding table 2

DI5 Status (bit 1)	DI4 Status (bit 0)	Speed
OFF	OFF	Keep the frequency setting
OFF	ON	Preset 2 (P04.02)
ON	OFF	Preset 3 (P04.03)
ON	ON	Preset 4 (P04.04)

About 16 presets (P04.01～P04.16) control, please refer to Menu P04.

3: AI1

In this mode, frequency reference can be adjusted by changing the value of analogue input1.

About AI1 signal mode, there are current mode and voltage mode, details please refer to the explanation of parameter P08.02.

4: AI2

In this mode, frequency reference can be adjusted by changing the value of analogue input2.

AI2 has only voltage mode.

AI2 detail setup please refers to Menu P08.

5: Serial comms.

Under this mode, users can change the value of P04.01 (Preset1) for the reference. Details please refer to *chapter 4 Communication*.

6: DI7 Pulse input

In this mode, the frequency can be adjusted by the external pulse counter of DI7.

When P09.24=2, DI7 function is reference channel (by input pulse).

For example:

The maximum frequency of input pulse (P09.27) is 20.0kHz. the actual input pulse is 10.0kHz.

The percentage of DI7 pulse input (P09.38) is 50.0%. Then the reference is:

Reference = DI7 input percentage (P09.38) × maximum reference (P01.02)

= 50.0% × 50.00Hz

= 25.00Hz

Details please refer to Menu P09.

7: Optional card (By option modules)

By option modules. The HD700 drives which software version of control board is 1.04 and above support HDOM-Profibus-V0 bus module.

8: User-programmed

By destination and source control, the user can define the reference channel freely.

For example, through Menu P17, the user can define the reference source. About actual application guide, please refer to the Menu P15, Menu P17 and the explanation of parameter P01.27.

P01.02	**Maximum frequency (P00.07)**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～300.0Hz				
Default	50.00Hz				
Change mode	Stop Only				

This parameter is used to define drive absolute maximum frequency reference.

P01.03	Minimum frequency (P00.08)				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～maximum frequency				
Default	0.00Hz				
Change mode	Stop Only				

This parameter is used to define drive minimum frequency reference.

If P03.01=0 (reverse is enabled), then the P00.08 is fixed at 0.00Hz.

P01.04	Jog frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～P01.02				
Default	5.00Hz				
Change mode	Run&Stop				

This parameter is used to define drive jogging frequency reference.

P01.05	Skip frequency 1				
P01.06	Skip frequency 2				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～maximum frequency				
Default	0.00Hz				
Change mode	Stop Only				

P01.07	Band of skip frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～30.00Hz				
Default	0.00Hz				
Change mode	Stop Only				

Two skip references are available to prevent continuous operation at a speed that would cause mechanical resonance. When a skip reference parameter is set to 0, filter is disabled. The skip reference band parameters define the frequency or speed range either side of the programmed skip reference, over which reference are rejected. The actual reject band is therefore twice that programmed in these parameters, the skip reference parameters defining the centre of the band. When the selected reference is within a band, the lower limit value of the band is the last reference. The last reference is limited among minimum frequency (P01.03) to maximum frequency (P01.02).

For example 1:

P01.02=50.00Hz, P01.03=0.00Hz, P01.05=2.00Hz, P01.06=5.00Hz, P01.07=1.00Hz. (Other parameters with default).

When the given frequency is among 1.00Hz to 3.00Hz, the last frequency is 1.00Hz. When the given frequency is among 4.00Hz to 6.00Hz, the last frequency is 4.00Hz. The frequency out of skip reference band is not changed.

For example 2:

P01.02=50.00Hz, P01.03=0.10Hz, P01.05=2.00Hz, P01.06=48.00Hz., P01.07=3.0Hz. (Other parameters with default)

When the given frequency is among 0.00Hz to5.00Hz, the last frequency is 0.10Hz.When the given frequency is among 45.00Hz to 50.00Hz, the last frequency is 45.00Hz. The frequency out of skip reference band is not changed.

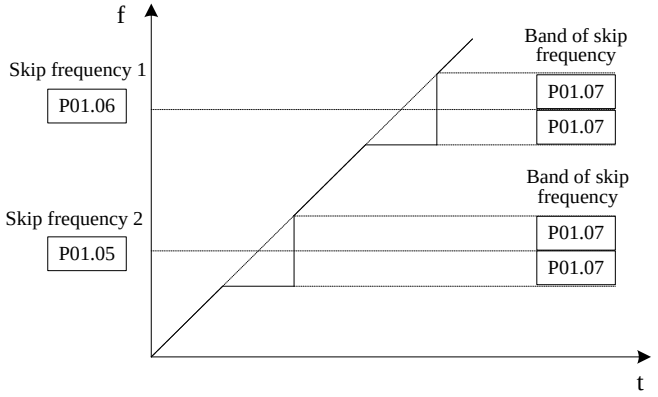


Figure 2-1-1 Skip frequency example

NOTE:

- The drive output frequency can pass through band of skip frequency during acceleration and deceleration.
- Do not overlap two skip reference bands.

P01.08	**Reserved**				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P01.09	**Keypad reference display**				
Coding	RW	US	PT	ND	PS
			■		■
Range	− max. frequency (P01.02)～+ max. frequency (P01.02)				
Change mode	Actual				

This parameter is the reference used when digital reference1 is selected.

When P01.01=0, the reference value can be changed with UP or Down key in the status mode (excluding fault occurs).

P01.09 has no negative frequency display in the non reverse mode.

P01.10	**E-pot reference display**				
Coding	RW	US	PT	ND	PS
				■	■
Range	− max. frequency (P01.02)～+ max. frequency (P01.02)				
Change mode	Actual				

This parameter is the reference used when the UP\DOWN terminals reference is selected.

P01.10 has no negative frequency display in the non reverse mode.

P01.11	Power up keypad reference (P00.12)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: 0.00Hz 1: running reference when last power off 2: preset1				
Default	0				
Change mode	Run&Stop				

The parameter is used to select the value of the keypad reference on power up.

Table 2-1-3 Power up keypad reference

P01.11=	Function
0	Keypad reference is zero.
1	Keypad reference is last used value.
2	Keypad reference is copied from Preset speed1 (P04.01)

P01.12	Threshold of zero speed				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0.00Hz～maximum frequency (P01.02)				
Default	0.50Hz				
Change mode	Run&Stop				

This parameter is used with P01.24 together.

NOTE: This parameter is nonpolar.

For example:

Set P01.12=0.50Hz, when the output frequency is ranged −0.5Hz to 0.5Hz, at the same time the drive is running (I.E. P05.27=1), then P01.24=1.

P01.13	Band of frequency arrival				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0.00Hz～maximum frequency (P01.02)				
Default	2.50Hz				
Change mode	Run&Stop				

This parameter is supplementary define of P01.23. As figure shown below, when output frequency of drive is in the error, then P01.23=1.

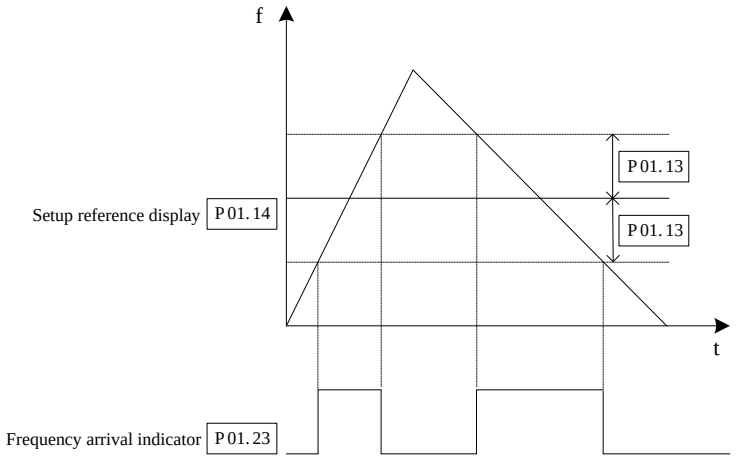


Figure 2-1-2 Error of at speed example

P01.14	Setup reference display				
Coding	RW	US	PT	ND	PS
			■	■	
Range	− max. frequency (P01.02)～+ max. frequency (P01.02)				
Change mode	Actual				

This parameter is used to define drive setting frequency.

P01.15	Preset select bit0 status				
P01.16	Preset select bit1 status				
P01.17	Preset select bit2 status				
P01.18	Preset select bit3 status				
Coding	RW	US	PT	ND	PS
				■	
Range	0～1				
Change mode	Actual				

P01.19	Preset select indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	preset1～preset16				
Change mode	Actual				

This parameter is used to select the actual preset speed reference.

If set P01.01=2 (reference source is a preset speed reference), the digital input terminals control the value of P01.15 to P01.19 and realize 16-preset running through the advanced application of digital input terminals (P09.01=1).

The relations between P01.15 to 01.18 and P01.19 are shown as below:

Table 2-1-4 Preset and the preset terminal mapping table

P01.18	P01.17	P01.16	P01.15	Reference selector	P01.19
OFF	OFF	OFF	OFF	Preset1	1
OFF	OFF	OFF	ON	Preset2	2
OFF	OFF	ON	OFF	Preset3	3
OFF	OFF	ON	ON	Preset4	4
OFF	ON	OFF	OFF	Preset5	5
OFF	ON	OFF	ON	Preset6	6
OFF	ON	ON	OFF	Preset7	7
OFF	ON	ON	ON	Preset8	8
ON	OFF	OFF	OFF	Preset9	9
ON	OFF	OFF	ON	Preset10	10
ON	OFF	ON	OFF	Preset11	11
ON	OFF	ON	ON	Preset12	12
ON	ON	OFF	OFF	Preset13	13
ON	ON	OFF	ON	Preset14	14
ON	ON	ON	OFF	Preset15	15
ON	ON	ON	ON	Preset16	16

NOTE:

- When digital input terminals are basic application (P09.01=0), the drive only can realize 4-preset running.
- About basic and advanced applications of digital input terminals, refer to the Menu P09.

P01.20	AI1 reference display				
P01.21	AI2 reference display				
Coding	RW	US	PT	ND	PS
				■	
Range	− max. frequency (P01.02)～+ max. frequency (P01.02)				
Change mode	Actual				

These parameters are made available for control by analogue inputs that are required to be frequency references.

P01.22	RUN/STOP indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0: Stop is active 1: Run is active				
Change mode	Actual				

The parameter indicates that the drive is in running or stopping status.

NOTE:

- This parameter indicates whether RUN/STOP Command is valid, it cannot indicate the work status of the drive.
- In ramp stop mode, P01.22=0, while P05.27 (indicates the work status of the drive) =1.

P01.23	Frequency arrival indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0～1				
Change mode	Actual				

When running reference (P05.11) = setup reference (P01.14), P01.23=1.

NOTE: This parameter is used with P01.03 (band of frequency arrival) together. Details please refer to the explanation of the parameter P01.03.

P01.24	Zero speed indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0～1				
Change mode	Actual				

Indication of the zero speed operation status of the drive.

This parameter is used with P01.12 (threshold of zero speed) together. Details please refer to the explanation of the parameter P01.12.

P01.25	Reference source is switched to AI1				
P01.26	Reference source is switched to AI2				
Coding	RW	US	PT	ND	PS
				■	
Range	0～1				
Change mode	Actual				

These parameters are made available for control by analogue inputs that are required to be frequency references. With these parameters, main speed source can be quickly set to AI1 or AI2 by corresponding terminal operation. Either P01.25 or P01.26 can be valid at the same time. That is both P01.25 and P01.26 are valid controlled by different digital input terminal. The condition is not allowed. If it occurs, the following priority level is run. P01.25 > P01.26 > P01.01.

Assumed that:

P01.01=0 (Speed source given by keypad)

P09.01=1 (Digital terminal in programmable mode)

P09.02=1.25 (DI1 controls that main speed source switch to AI1)

P09.03=1.26 (DI1 controls that main speed source switch to AI1)

The following table shows the corresponding condition:

Table 2-1-5 Reference source is switched to AI1

P01.01=	DI1	DI2	P01.14 (setup reference)
0	OFF	OFF	=P01.09 (keypad)
0	OFF	ON	=P01.21 (AI2)
0	ON	OFF	=P01.20 (AI1)
0	ON	ON	=P01.20 (AI1)

P01.27	User-programmed reference display				
Coding	RW	US	PT	ND	PS
				■	
Range	− maximum frequency～+ maximum frequency				
Change mode	Actual				

Select this function when main and auxiliary reference is needed.

If set P01.01=8, reference source is connected with this parameter (see Menu 1A Logic diagram). It is flexible for the user to program reference source by using this parameter. P01.27 is assigned after the various enhance function blocks process reference, realizing the user specific needs.

For example:

In the main and auxiliary reference applications, the keypad reference (P01.09) is the main reference and preset 1 (P04.01) is the auxiliary reference. In order to realize setup reference (P01.14) = keypad reference (P01.09) + preset 1 (P04.01), the user can make the following settings:

P17.11＝1.09, operation module 1 input 1 source is keypad reference.

P17.12＝4.01, operation module 1 input 2 source is preset 1.

P17.17＝1.27, the value of operation module 1 output is given to P01.27 (select P01.27 by using P17.17)

P17.15＝2, operation module 1 mode is input 1 + input 2

P01.01＝8, setup reference (P01.14)=user programmed reference (P01.27)

Refer to Menu P17 for details.

P01.28	Output frequency detection (FDT) threshold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～P01.02				
Default	0.00Hz				
Change mode	Run&Stop				

P01.29	Output frequency detection (FDT) width				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～P01.28				
Default	0.00Hz				
Change mode	Run&Stop				

P01.30	Output frequency detection (FDT) indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0: off 1: on				
Change mode	Actual				

If the absolute value of P05.11 (output frequency) is more than or equal to the value of P01.28 adding P01.29, output frequency detection signal is valid. If the absolute value of P05.11 (output frequency) is less than or equal to the value of P01.28 subtracting P01.29, output frequency detection signal is invalid. As shown in the figure:

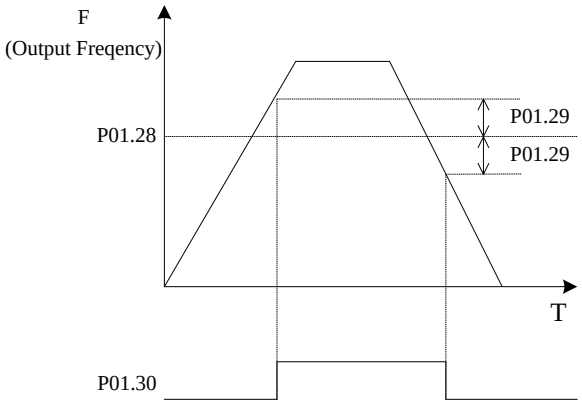


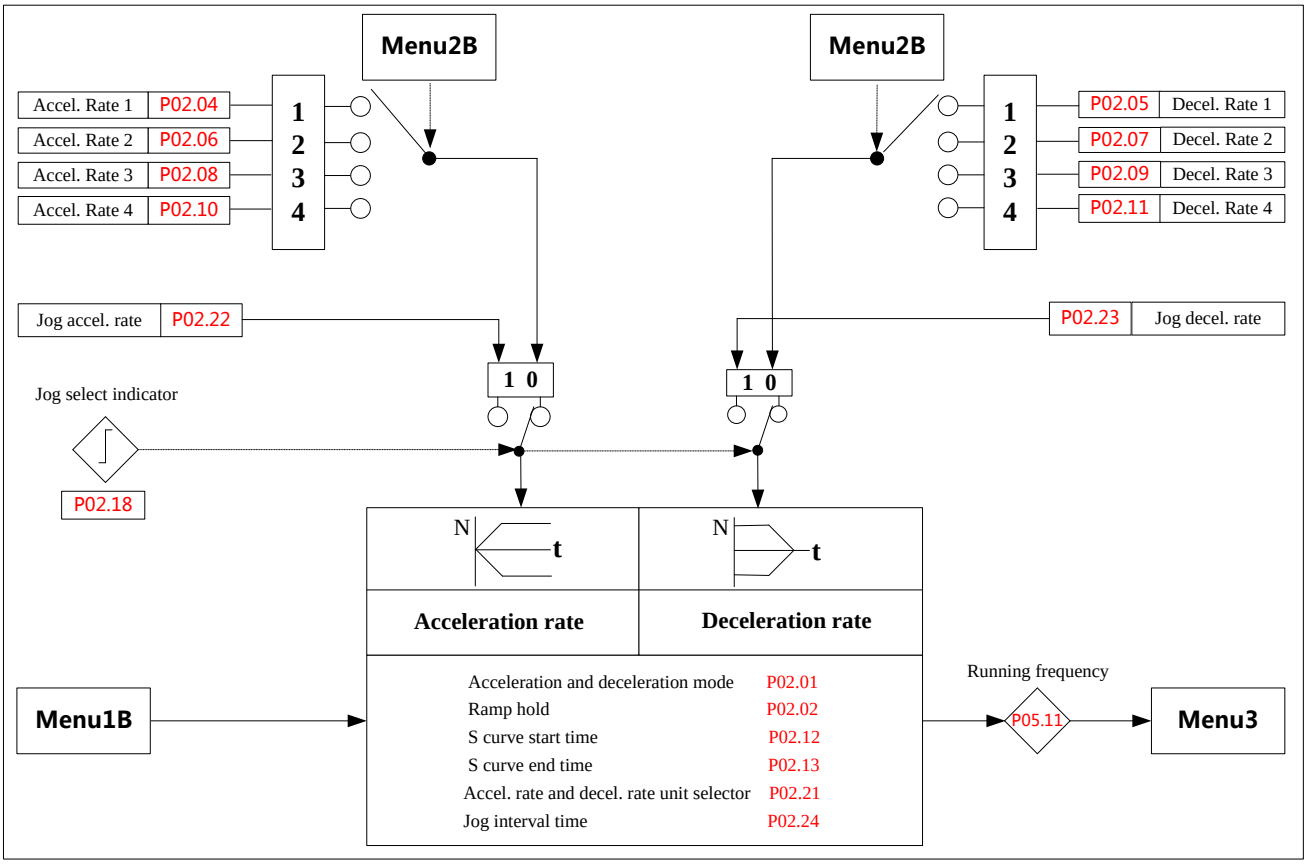
Figure 2-1-3 FDT

2.2 Menu P02: Ramp

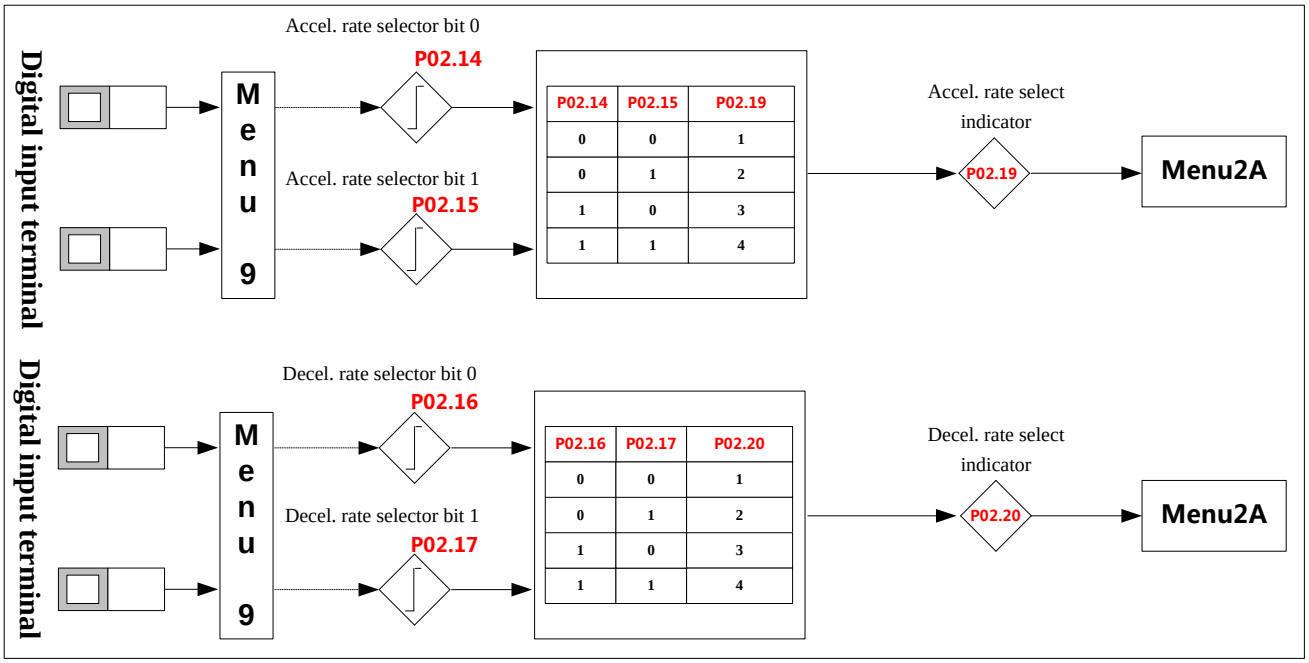
ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P02.01	Acceleration and deceleration mode	0: line 1: S curve	1	0	Stop Only	00C8H
P02.02	Ramp hold	0: off 1: on	1	0	Run&Stop	00C9H
P02.03	Reserved	–	–	–	–	–
P02.04	Accel. rate1	0.0～3600.0	0.1	10.0	Run&Stop	00CBH
P02.05	Decel. rate1	0.0～3600.0	0.1	20.0	Run&Stop	00CCH
P02.06	Accel. Rate2	0.0～3600.0	0.1	30.0	Run&Stop	00CDH
P02.07	Decel. Rate2	0.0～3600.0	0.1	30.0	Run&Stop	00CEH
P02.08	Accel. Rate3	0.0～3600.0	0.1	30.0	Run&Stop	00CFH
P02.09	Decel. Rate3	0.0～3600.0	0.1	30.0	Run&Stop	00D0H
P02.10	Accel. Rate4	0.0～3600.0	0.1	30.0	Run&Stop	00D1H
P02.11	Decel. Rate4	0.0～3600.0	0.1	30.0	Run&Stop	00D2H
P02.12	S curve start time	0.0%～40.0%	0.1%	20.0%	Run&Stop	00D3H
P02.13	S curve finish time	0.0%～40.0%	0.1%	20.0%	Run&Stop	00D4H
P02.14	Acceleration rate selector bit0 status	0: off 1: on	1	Actual	Actual	00D5H
P02.15	Acceleration rate selector bit1 status	0: off 1: on	1	Actual	Actual	00D6H
P02.16	Deceleration rate selector bit0 status	0: off 1: on	1	Actual	Actual	00D7H
P02.17	Deceleration rate selector bit1 status	0: off 1: on	1	Actual	Actual	00D8H
P02.18	Jog select indicator	0: off 1: on	1	Actual	Actual	00D9H
P02.19	Accel. Rate select indicator	Accel. rate1～Accel. rate 4	1	Actual	Actual	00DAH
P02.20	Decel. Rate select indicator	Decel. rate1～Decel. rate 4	1	Actual	Actual	00DBH
P02.21	Accel. Rate & Decel. Rate unit selector	0: second 1: minute	1	0	Stop Only	00DCH
P02.22	Jog Accel. rate	0.1s～600.0s	0.1s	10.0s	Run&Stop	00DDH
P02.23	Jog Decel. rate	0.1s～600.0s	0.1s	10.0s	Run&Stop	00DEH
P02.24	Jog interval time	0.1s～600.0s	0.1s	1.0s	Run&Stop	00DFH
P02.25	E-Pot output negative permit	0: only positive 1: negative permit	1	0	Run&Stop	00E0H
P02.26	UP/DN Accel. rate	0s～250s	1s	10s	Run&Stop	00E1H
P02.27	E-pot output scaling	0.000～4.000	0.001	1.000	Run&Stop	00E2H
P02.28	Function selector of E-pot output	P01.01～P18.08	0.01	P01.10	Stop Only	00E3H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P02.29	Reset of E-pot output	0: off 1: on	1	0	Run&Stop	00E4H
P02.30	UP	0: off 1: on	1	0	Run&Stop	00E5H
P02.31	DOWN	0: off 1: on	1	0	Run&Stop	00E6H
P02.32	E-Pot output display	−100.0%～+100.0%	0.1%	Actual	Stop Only	00E7H
P02.33	Power up E-Pot reference	0: 0 1: running reference at last power off 2: 0, only can be changed when drive is active 3: running reference at last power off, only can be changed when drive is active 4: Preset 1 5: Preset 1, UP, DOWN are only active when the drive is running. Reset is active at all times.	1	0	Run&Stop	00E8H
P02.34	Power off E-Pot output selector	0: Keep 1: Reset	1	0	Run&Stop	00E9H

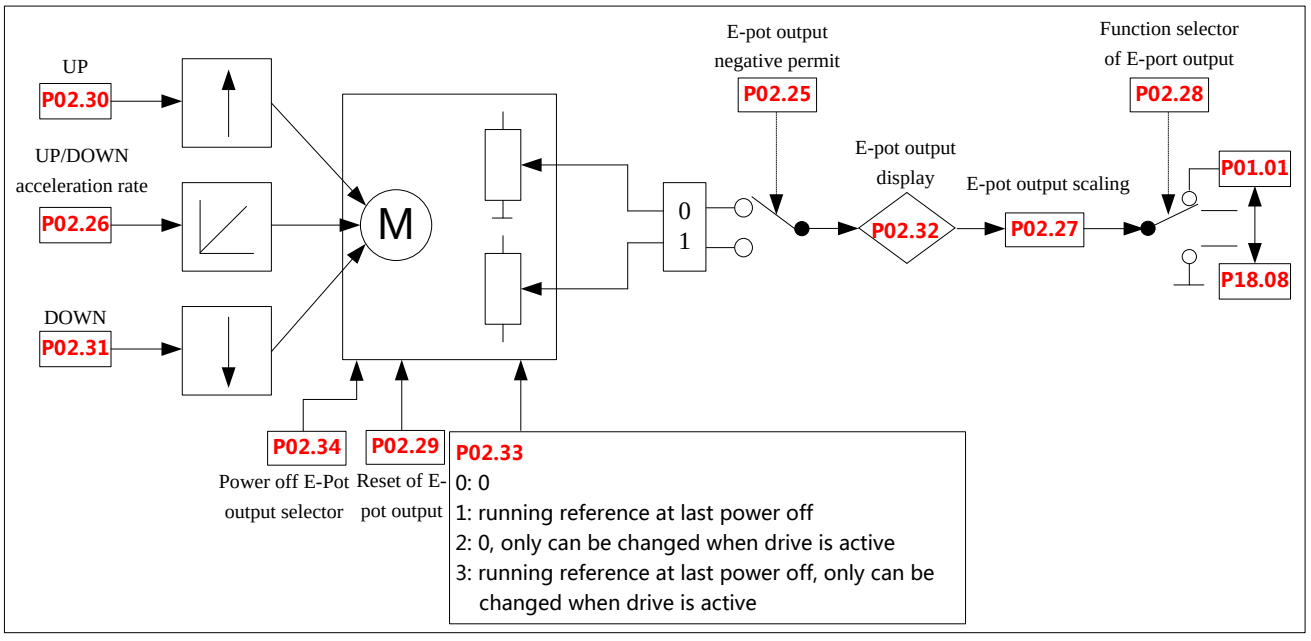
Menu 2A Logic diagram



Menu 2B Logic diagram



Menu 2C Logic diagram



P02.01	Acceleration and deceleration mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: line 1: S curve				
Default	0				
Change mode	Stop Only				

This parameter is used to select the Acceleration/Deceleration mode.

0: Standard ramp (linear)

Output frequency increase or decrease in accordance with a linear ramp.

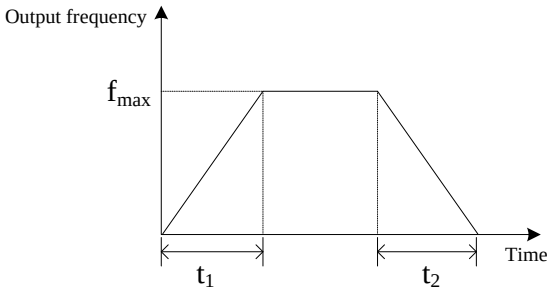


Figure 2-2-1 Standard ramp (linear)

1: S curve

Output frequency increase or decrease in accordance with an S curve.

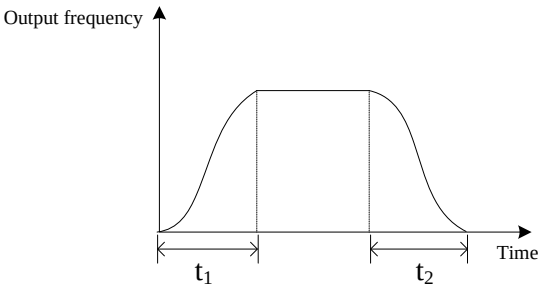


Figure 2-2-2 S curve

When the acceleration is starting or the speed is arriving and the deceleration is starting or the speed is arriving, set the S ramp mode. It makes the acceleration and the deceleration smooth and reduces the shock. It fits for the starting and stopping when transfers the load, like the elevator, belt and so on.

P02.02	Ramp hold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

If this bit is set the ramp will be held. If S ramp is enabled the acceleration will ramp towards zero causing the ramp output to curve towards a constant speed. If a drive stop is demanded, the ramp hold function is disabled.

P02.03	Reserved				
Coding	RW	US	PT	ND	PS
Range					
Change mode					

P02.04	Acceleration rate 1 (P00.09)				
P02.06	Acceleration rate 2				
P02.08	Acceleration rate 3				
P02.10	Acceleration rate 4				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0～3600.0				
Default	10.0, 30.0, 30.0, 30.0				
Change mode	Run&Stop				

P02.05	Deceleration rate 1 (P00.10)				
P02.07	Deceleration rate 2				
P02.09	Deceleration rate 3				
P02.11	Deceleration rate 4				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0～3600.0				
Default	20.0, 30.0, 30.0, 30.0				
Change mode	Run&Stop				

Acceleration rate is that the drive frequency accelerates from 0Hz to maximum operating frequency (P01.02) time. Deceleration rate is that the drive frequency decelerates from maximum operating frequency (P01.02) to 0Hz time.

HD700 series drive has defined four acceleration/deceleration rates, it can be selected through different combinations of the control terminals. Please refer to the explanation of parameters P02.14 to P02.17 for detail.

For example:

Set maximum frequency (P01.02)=50.00Hz, minimum frequency (P01.03)=5.00Hz, setup frequency (P01.14)=10.0s, then the acceleration rate is 10.0s×(25.00Hz/50.00Hz) =5.0s. The keypad displays 0.00Hz to 25.00Hz, not 5.00Hz to 25.00Hz.

P02.12	S curve start time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～40.0%				
Default	20.0%				
Change mode	Run&Stop				

P02.13	S curve finish time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～40.0%				
Default	20.0%				
Change mode	Run&Stop				

P02.12 indicates S curve start time in acceleration or deceleration.

P02.13 indicates S curve finish time when the drive accelerates or decelerates to the stable running frequency.

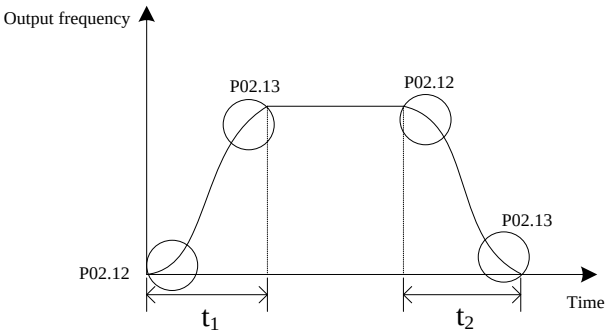


Figure 2-2-3 S curve start and finish time

NOTE:

- P02.12 and P02.13 only become effective when P02.01=1, and make sure that P02.12+P02.13 ≤ 90.0%.
- The value of P02.12 and P02.13 is a percentage of the actual acceleration or deceleration rate.
  For example:
  P01.02 (the maximum frequency)=50.00Hz, P02.04 (acceleration rate 1)=10s, P02.12=20%, P02.13=30%, if setup reference is 25.00Hz, the acceleration rate is 5s after the drive starts.
  S curve start time=5s×20.0%＝1s, S curve finish time＝5s×30.0%＝1.5s.

P02.14	Acceleration rate selector bit0 status				
P02.15	Acceleration rate selector bit1 status				
Coding	RW	US	PT	ND	PS
Range	0～1				
Change mode	Actual				

P02.16	Deceleration rate selector bit0 status				
P02.17	Deceleration rate selector bit1 status				
Coding	RW	US	PT	ND	PS
Range	0～1				
Change mode	Actual				

P02.14 to P02.17, these bits are for control by logic inputs such that ramp rates can be selected by external control.

P02.18	Jog select indicator				
Coding	RW	US	PT	ND	PS
			■		
Range	0～1				
Change mode	Actual				

This parameter indicates that if jog is effective.

P02.18＝0, jog is disable; P02.18＝1, jog is enabled.

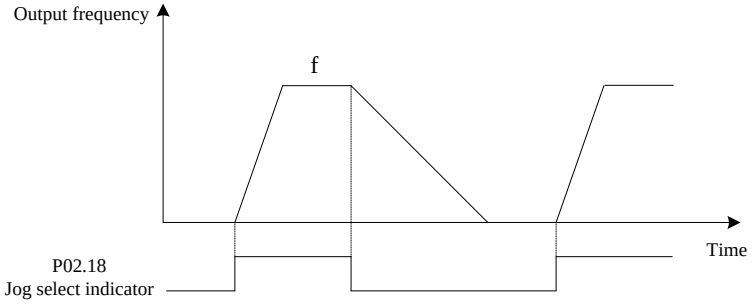


Figure 2-2-4 Jog running

P02.19	Acceleration rate select indicator				
P02.20	Deceleration rate select indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	1～4				
Change mode	Actual				

These parameters indicate the acceleration and deceleration time being selected, it is controlled by P02.14 to P02.17.

Table 2-2-1 Acceleration rate selector

P2.15 (Accel. rate selector bit1 status)	P2.14 (Accel. rate selector bit0 status)	P02.19 (Accel. rate select indicator)
0	0	1 (Accel. rate1 P2.04)
0	1	2 (Accel. rate 2 P2.06)
1	0	3 (Accel. rate 3 P2.08)
1	1	4 (Accel. rate 4 P2.10)

Table 2-2-2 Deceleration rate selector

P2.17 (Decel. rate selector bit1)	P2.16 (Decel. rate selector bit0)	P02.20 (Decel. rate select indicator)
0	0	1 (Decel. rate1 P2.05)
0	1	2 (Decel. rate12 P2.07)
1	0	3 (Decel. rate13 P2.09)
1	1	4 (Decel. rate14 P2.11)

P02.21	Acceleration and deceleration rate unit selector				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	0				
Change mode	Stop Only				

0: s (second)

1: m (minute)

This parameter defines the unit of acceleration and deceleration rate 1 to 4.

P02.22	Jog acceleration rate				
P02.23	Jog deceleration rate				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.1～600.0				
Default	10.0				
Change mode	Run&Stop				

P02.24	Jog interval time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.1s～600.0s				
Default	0.1s				
Change mode	Run&Stop				

As figure shown, t_1 is the jog acceleration rate and t_3 is the jog deceleration rate, t_2 is jog time; t_4 is jog interval time (P02.24), f_1 is jog frequency (P01.04). The actual jog acceleration rate t_1 can be determined by the following formula. So does the jog deceleration rate t_3.

$$t_1 = \frac{\text{P01.04 (Jog frequency)} \times \text{P02.22}}{\text{P01.02 (Maximum frequency)}}$$

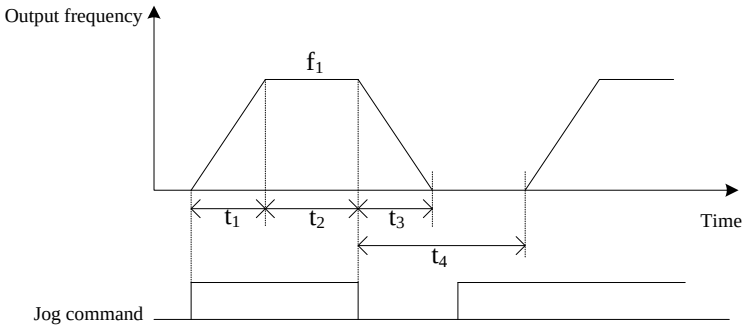


Figure 2-2-5 Jog parameter explain

The jog interval time (P02.24) is the waiting time from the last jog command cancelling to the next command effecting. In the jog interval time, the jog command cannot make the drive run, and the drive will run at 0Hz without output. If the jog command keeping, it will be executed as soon as the interval time is over.

NOTE:

- In the keypad control mode, the jog operation can be realized by pressing the key MF. Loosen the MF key and the drive stops according to the stop mode P03.10. In the terminal control mode, the jog operation can be realized by setting jog FWD and REV terminals. Besides, the jog operation can be realized by communication.
- When the drive is jogging, acceleration/deceleration rate is determined by P02.22/P02.23.

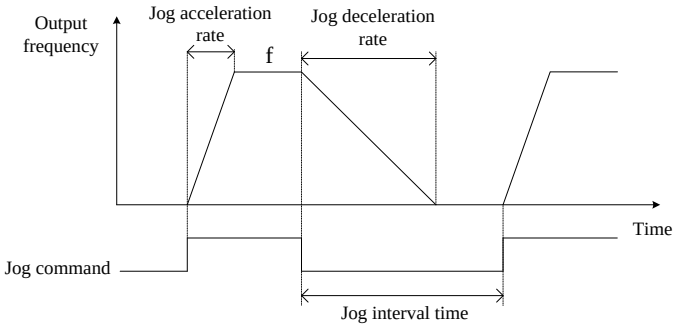


Figure 2-2-6 Jog accel. rate and decel. rate

- The jog operation is effective in not-running mode.
- When the drive is jogging, the run command is disabled.

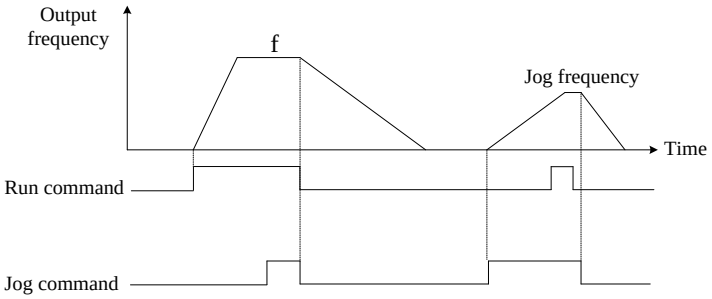


Figure 2-2-7 Jog command

P02.25	E-Pot output negative permit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	0				
Change mode	Run&Stop				

When this bit is set to OFF (0), the motorized pot output is limited to positive values only (0 to 100.0%). Setting it to On (1) allows negative outputs also (−100.0% to 100.0%).

P02.26	UP/DOWN acceleration rate				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0s～250s				
Default	10s				
Change mode	Run&Stop				

This parameter defines the time taken for the motorized pot function to ramp from 0 to 100.0%. Twice this time will be taken to adjust the output from −100.0% to +100.0%.

P02.27	E-pot output scaling				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.000～4.000				
Default	1.000				
Change mode	Run&Stop				

This parameter can be used to restrict the output of the motorized pot to operate over a reduced range so that it can be used as a trim for example. There is an automatic scaling such that when this parameter is set to 1.000, a 100% level on the motorized pot will cause the programmed destination parameter to be at its maximum value.

P02.28	Function selector of E-pot output				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P01.01～P18.08				
Default	P01.10				
Change mode	Stop Only				

This needs to be set up with the parameters that the motorized pot is to control. Only parameters which are not protected can be controlled by the motorized pot function, if a non valid parameter is programmed the output is not routed anywhere. If the motorized pot is to control speed then it is suggested that one of the preset speed parameters is entered here.

P02.29	Reset of E-pot output				
P02.30	UP				
P02.31	DOWN				
Coding	RW	US	PT	ND	PS
	■				
Range	0～1				
Default	0				
Change mode	Run&Stop				

These three bits control the motorized pot. The up and down inputs increase and decrease and decrease the output at the programmed rate respectively. If both up and down are active together the up function dominates and the output increases. If the reset input is set to On (1), the motorized pot output is reset and held at 0.0%.

Input terminals must be programmed to control these parameters to implement the motorized pot.

P02.30, P02.31 and 8, 9 basic application function of digital input terminal are equivalent. (refer to the explanation of the

parameter P01.01 and Menu P09 for detail). For example, set DI4, DI5 are UP and DOWN terminals:

Table 2-2-3 Define UP/DOWN terminal

Advanced application (P09.01＝1)	Basic applications (P09.01＝0)	Result
P09.05＝2.30	P09.05＝8	DI4 is UP terminal
P09.06＝2.31	P09.06＝9	DI5 is DOWN terminal

NOTE: UP and DOWN terminals are effective at the same time, E-pot output (P02.32) hold the current value.

P02.32	**E-pot output display**				
Coding	RW	US	PT	ND	PS
Range	−100.0%～+100.0%				
Change mode	Actual				

P02.33	**Power up E-pot reference**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～5				
Default	0				
Change mode	Run&Stop				

The Power up E-pot reference is given in the table below:

Table 2-2-4 Power up E-pot reference

P02.33	**Mode**	**Description**
0	Zero at power up	Reset to zero at each power-up. UP, DOWN and reset are active at all times.
1	Running reference at last power off	Set to value at power-down when drive power-up. UP, DOWN and reset are active at all times.
2	Zero at power up, and only can be changed when the drive is active	Reset to zero at each power-up.. UP, DOWN are only active when the drive is running. Reset is active at all times.
3	Running reference at last power off, only can be changed when the drive is active	Set to value at power-down when drive powered-up. UP, DOWN are only active when the drive is running. Reset is active at all times.
4	Preset 1	Set preset 1 value when drive powered-up.
5	Preset 1, only active when the drive is running.	Set to value at power-down when drive powered-up. UP, DOWN are only active when the drive is running. Reset is active at all times.

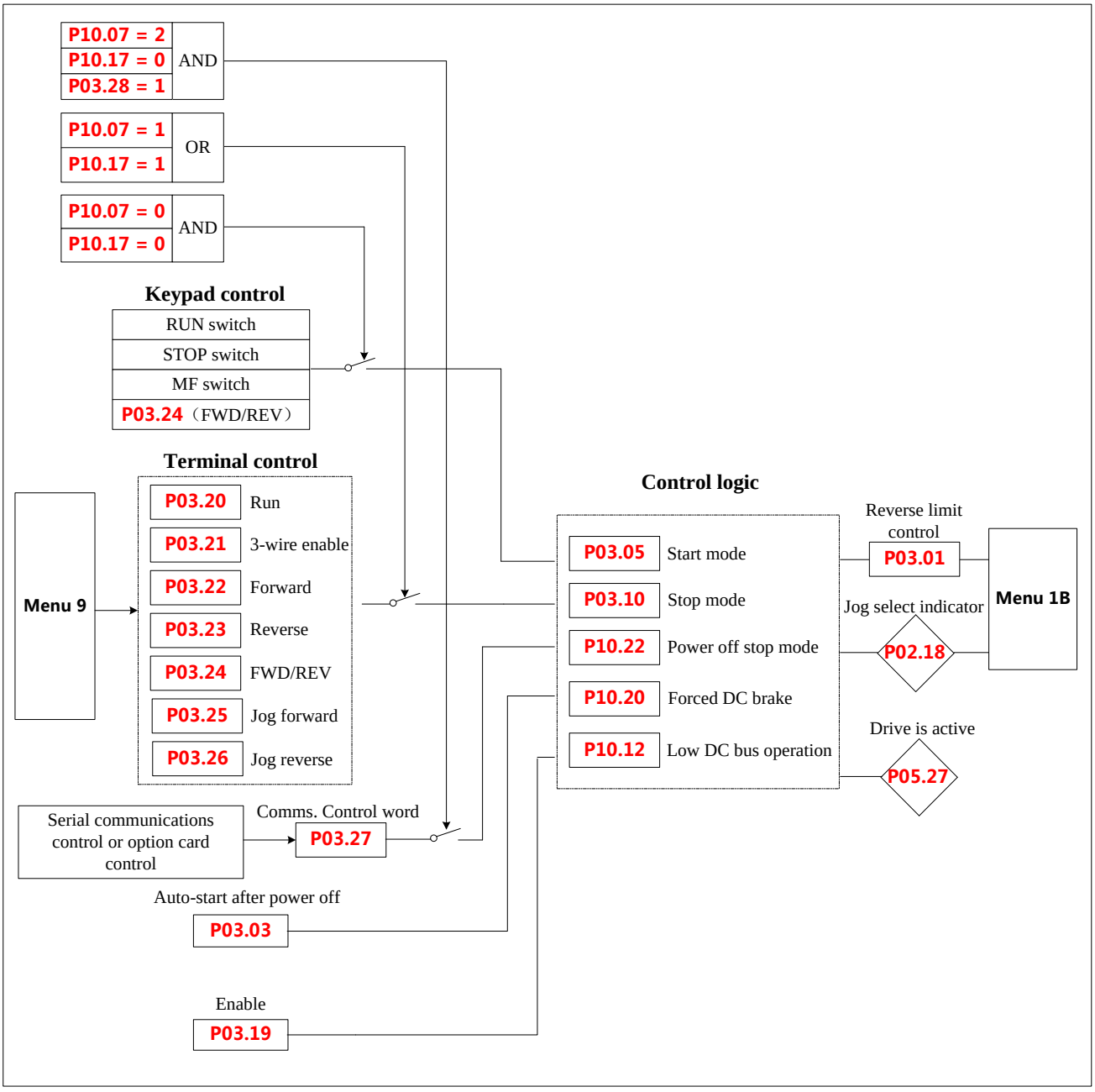
P02.34	Power off E-Pot output selector				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: Keep 1: Reset				
Default	0				
Change mode	Run&Stop				

2.3 Menu P03: Start and stop

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P03.01	Reverse limit control	0: reverse is permitted 1: reverse is disable	1	0	Stop Only	012CH
P03.02	Deadtime for running direction change	0.0s～3000.0s	0.1s	0.0s	Run&Stop	012DH
P03.03	Auto-start after power off	0: off 1: on	1	0	Stop Only	012EH
P03.04	Wait time for auto-start	0.0s～60.0s	0.1s	0.0s	Run&Stop	012FH
P03.05	Start mode	0: start directly 1: first DC injection, then start 2: catch spinning 3: reserced 4: reserved	1	0	Stop Only	0130H
P03.06	Start frequency	0.00Hz～P01.02	0.01Hz	0.00Hz	Run&Stop	0131H
P03.07	Hold time for start frequency	0.0s～60.0s	0.1s	0.0s	Run&Stop	0132H
P03.08	Start DC injection current	0.0%～100.0%	0.1%	0.0%	Run&Stop	0133H
P03.09	Start DC injection time	0.0s～60.0s	0.1s	0.0s	Run&Stop	0134H
P03.10	Stop mode	0: ramp 1: coasting 2: ramp+DC injection 3: ramp+coasting	1	0	Stop Only	0135H
P03.11	Stop frequency	0.00Hz～max. frequency	0.01Hz	0.10Hz	Run&Stop	0136H
P03.12	Stop DC injecting frequency	0.0%～20.0%	0.1%	0.0%	Run&Stop	0137H
P03.13	Stop DC injecting current	0.0%～100.0%	0.1%	0.0%	Run&Stop	0138H
P03.14	Stop DC injecting time	0.0s～60.0s	0.1s	0.0s	Run&Stop	0139H
P03.15	Dynamic brake control	0: disable 1: enable	1	1	Stop Only	013AH
P03.16	Dynamic brake rate	0.0%～100.0%	0.1%	50.0%	Run&Stop	013BH
P03.17	Dynamic brake DC voltage points	200V: 350V～390V 400V: 650V～780V 690V: 1000V～1125V	1V	200V: 390V 400V: 780V 690V: 1125V	Stop Only	013CH
P03.18	Reserved	–	–	–	–	–
P03.19	Enable	0: on 1: off (disable)	1	0	Run&Stop	013EH
P03.20	Run bit	0: off 1: on	1	0	Run&Stop	013FH
P03.21	3-wire enable	0: stop 1: run	1	0	Run&Stop	0140H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P03.22	FWD	0: off 1: on	1	0	Run&Stop	0141H
P03.23	REV	0: off 1: on	1	0	Run&Stop	0142H
P03.24	FWD/REV	0: FWD 1: REV	1	0	Run&Stop	0143H
P03.25	Jog forward	0: off 1: on	1	0	Run&Stop	0144H
P03.26	Jog reverse	0: off 1: on	1	0	Run&Stop	0145H
P03.27	Comms control word	0～65535	1	0	Run&Stop	0146H
P03.28	Control word enable	0: disable 1: enable	1	0	Run&Stop	0147H
P03.29	Reserved	–	–	–	–	–
P03.30	Reverse running indicator	0: forward 1: reverse	1	Actual	Actual	0149H

Menu 3 Logic diagram



P03.01	Reverse limit control				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: reverse is permitted 1: reverse is disable				
Default	0				
Change mode	Stop Only				

The parameter is used to control whether the motor is permitted to run reverse.

P03.02	Deadtime for running direction change				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～3000.0s				
Default	0.0s				
Change mode	Run&Stop				

The parameter is used to define deadtime for running direction change. Such as t_1 shown in the below figure:

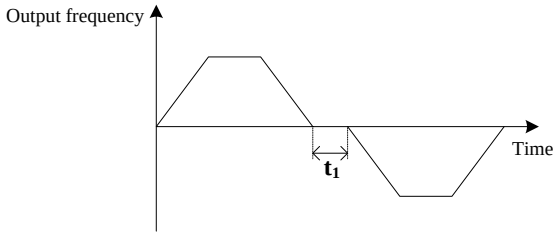


Figure 2-3-1 Dead time for running direction change

P03.03	Auto-start after power off				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	0				
Change mode	Stop Only				

0: auto-start after power off disabled

The drive will not start automatically after power up.

1: auto-start after power off enabled

When power up the drive will start automatically after time defined by P03.04 (wait time for auto-start) if satisfy the start conditions. When P03.03=1, in different operation command channels, the drive will respond differently after power up.

Table 2-3-1 The drive status after restarting in different operation command channels

Drive status before power off / Drive status after power on / Run command status		Stop	start
Keypad	No run command	Keep stop	Autostart
Serial communications	No run command	Keep stop	Autostart
Three-wire system 1/2	No run command	Keep stop	Autostart
	Run command	Keep stop	Autostart
Two-wire system	No run command	Keep stop	Keep stop
	Run command	Keep stop	Autostart

NOTE: In order to avoid accidents, please use the function carefully.

P03.04	Wait time for auto-start				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～60.0s				
Default	0.0s				
Change mode	Run&Stop				

The parameter is used with P03.03 together. Refer to the explanation of parameter P03.03 for detail.

P03.05	Start mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～4				
Default	0				
Change mode	Stop Only				

0: Start directly

Start with the set start frequency (P03.06) and start frequency hold time (P03.07).

1: First brake then start

First DC injection brake (Refer to P03.08、P03.09), then start with mode 0.

2: Catch a spinning motor start

Automatic tracking the motor speed and direction, the running motor can start smoothly without impact.

3: Reserved

4: Reserved

P03.06	Start frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～P01.02				
Default	0.00Hz				
Change mode	Run&Stop				

P03.07	Hold time for start frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～60.0s				
Default	0.0s				
Change mode	Run&Stop				

Start frequency (P03.06) is the initial frequency when the drive starts, as shown in the following picture f_s. The start frequency hold time (P03.07) is the time running at the start frequency when the drive starts, as shown in the following figure t_1.

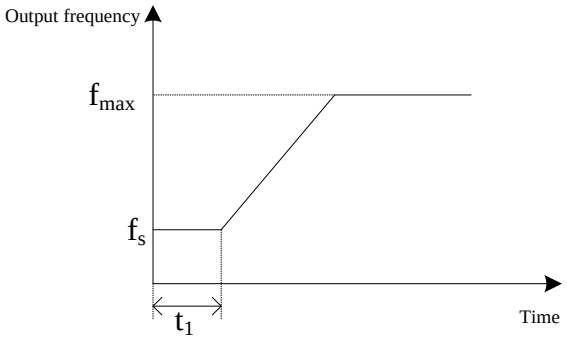


Figure 2-3-2 Hold time for start frequency

P03.08	Start DC injection current				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～300.0%				
Default	0.0%				
Change mode	Run&Stop				

P03.09	Start DC injection time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～60.0s				
Default	0.0s				
Change mode	Run&Stop				

P03.08, P03.09 only effective at first DC injection then start mode (P03.05=1), as shown in the figure 2-3-3.

P03.08 defines the current level used DC injection braking as a percentage of motor rated current. If the Start DC injection brake time (P03.09) is set to 0.0s, no DC injection when the drive starts.

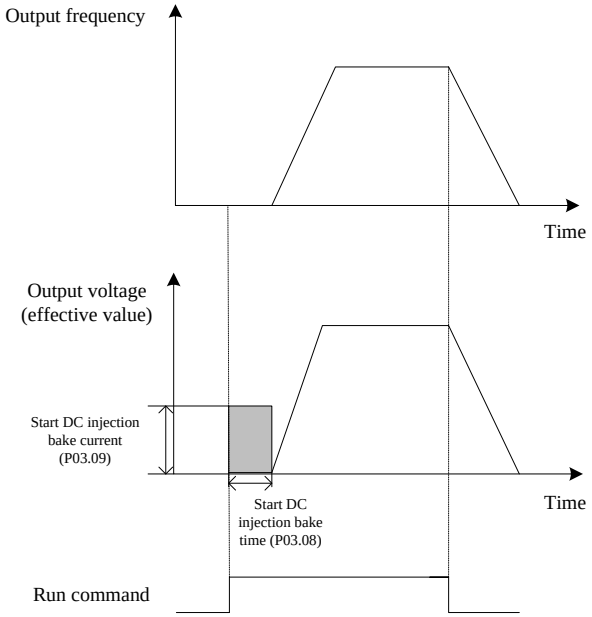


Figure 2-3-3 Start DC injection time

P03.10	Stop mode (P00.11)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0～3				
Default	0				
Change mode	Stop Only				

0: Ramp stop

When receiving the stop command, the drive ramp down to zero frequency.

1:Coast stop

When receiving the stop command, immediately terminating the output, the drive is freedom to stop as the mechanical inertia.

2: Ramp stop+DC injection

When receiving the stop command, the drive reduces the output frequency according to deceleration time. When it gets to the stop DC injection brake start frequency, the DC injection brake begins.

The function about the stop DC injection brake, please refer to the define in P03.08、P03.09.

3: Ramp stop+coast stop

P03.11	Stop frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～maximum frequency				
Default	0.10Hz				
Change mode	Run&Stop				

Set the detection value of stop speed when the drive set to stop.

P03.12	Stop DC injecting frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～100.0%				
Default	0.0%				
Change mode	Run&Stop				

The parameter is used to define DC injection brake initial frequency when set P03.10=2 (coasting).

P03.13	Stop DC injecting current				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～300.0%				
Default	0.0%				
Change mode	Run&Stop				

P03.14	Stop DC injecting time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00s～60.00s				
Default	0.0s				
Change mode	Run&Stop				

P03.13 defines the current level used DC injection braking as a percentage of motor rated current. If the Start DC injection brake time (P03.14) is set to 0.0s, no DC injection when the drive starts.

P03.15	Dynamic brake control				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	1				
Change mode	Stop Only				

0: disable

1: enable

P03.16	Dynamic brake rate				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～100.0%				
Default	50.0%				
Change mode	Run&Stop				

The value and power of the brake resistor must be considered when set this parameter.

P03.17	Dynamic brake DC voltage points				
Coding	RW	US	PT	ND	PS
	■	■			
Range	200V: 350V～390V 400V: 650V～780V 690V: 1000V～1125V				
Default	200V: 390V 400V: 780V 690V: 1125V				
Change mode	Stop Only				

P03.18	Reserved				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P03.19	Enable				
P03.20	Run bit				
P03.21	3-wire enable				
P03.22	FWD				
P03.23	REV				
P03.24	FWD/REV				
P03.25	Jog forward				
P03.26	Jog reverse				
Coding	RW	US	PT	ND	PS
	■				
Range	0～1				
Default	0				
Change mode	Run&Stop				

In the terminal control mode, the motor start and stop is defined by parameters P03.19 to P03.26. The user can set the parameters control source according to the actual requires. These parameters can be routed to terminals or other control source.

Read and written results of these parameters are not saved into EEPROM, even if power off. These parameters are reset to zero after power up.

These parameters (except P03.24) are only enabled in terminal control mode.

- If P03.25 or P03.26 is set to 1, then P02.18 is set to 1. It means jog running. If P03.25 is set to 1, jog forward; if P03.26 is set to 1, jog reverse.
- When the drive is not jogging, it tests P03.22 (FWD) and P03.23 (REV) status at first. If one of them is set to 1, the motor will run as setting. If P03.22 and P03.23 are set to zero, the drive determines whether the motor can run according to P03.20 status and the direction is defined by P03.24 (FWD/REV). If P03.20 is set to 0, the drive is in the state of stop. If P03.20 is set to 1, the drive starts. If P03.24 is set to 0, the motor runs forward. If P03.24 is set to

1, the motor runs reverse. If P03.22 and P03.23 are set to 1, the motor will stop.

- If P03.19 is set to 1, the drive is enabled.
- In keypad control mode, P03.19 to P03.26 (except P03.19 and P03.24) are disabled. P03.24 controls the motor running forward or reverse.
- In terminal control mode, terminals control these parameters status. There are two terminal control modes (selected by P09.22): 2-wire mode and 3-wire mod. P03.21 is 3-wire enable parameter. Refer to the explanation of P09.22.

P03.27	**Serial comms control word**				
Coding	RW	US	PT	ND	PS
	■				
Range	0～65535				
Default	0				
Change mode	Run&Stop				

P03.28	**Serial comms control word enable**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	0				
Change mode	Run&Stop				

P03.27 and P03.28 used Serial comms control word provide one of start and stop modes. When P03.28 is disable (P03.28=0), control word is ineffective. Driver start/stop operation is not used P03.27.

P03.27 is a 16-bit binary number. The meanings of each bit are shown as the following table. It is displayed in decimal form on the keypad.

Table 2-3-2 Serial comms control word

Bit	**Bit function**	**As same parameter**
0	Drive enable	P03.19
1	Run	P03.20
2	3-wire enable	P03.21
3	Run forward	P03.22
4	Run reverse	P03.23
5	FOR/REV	P03.24
6	Jog forward	P03.25
7	Jog reverse	P03.26
8	Reset trips	P12.15
9	Save parameters	−
10	clean trip recoding	−
11	Enable comms to write parameters	−
12	Reserved	−
13	Reserved	−
14	Reserved	−
15	Reserved	−

Bit 0～7: Start and stop logic control of the drive. In serial communication control mode (P01.03=1), the user can control

the drive by changing comms control word (P03.12).

Bit 8: The bit changing from 0 to 1 will reset the drive (fault conditions disappear and the failure code < F030).

Bit 9: The bit changing from 0 to 1 will bring parameters saved to the EEPROM.

Bit 10: The bit changing from 0 to 1 will clean error recording of the drive.

Bit 11: The bit changing from 0 to 1 will make selector parameters become effective.

Bit 0～7: Start and stop logic control of the drive. They have the same function with P03.19 to P03.27 but they are not affected by P03.19 to P03.27. Changing the value of P03.27 each bit will not cause P03.19 to P03.26 to change and vice versa. In serial communication control mode (P00.03 or P10.07＝2), the user can control the drive by changing comms control word (P03.27).

Table 2-3-3 Source reference is serial communication

Source parameter selector	
Analogue output function selector	P08.13
Relay function selector	P09.10, P09.11
Digital output function selector	P09.30, P09.31
PID reference source	P15.01, P15.02, P15.03
Logic block source	P16.01, P16.03, P16.08, P16.10
Threshold block source and variable selector source	P17.01, P17.06, P17.11, P17.12, P17.18, P17.19, P17.25, P17.26
Function selector of E-pot output	P02.28
Analogue input function selector	P08.03, P08.08
Digital input terminal function selector	P09.02 to P09.08
PID output function selector	P15.15
Logic block output function selector	P16.07, P16.14, P16.19
Threshold block and variable output function selector	P17.05, P17.10, P17.17, P17.24, P17.31

NOTE:

- These parameters are set through the keypad, it will be effective after pressing the PRG key;
- Different destination parameter selector select the same destination parameter will cause function conflict, to avoid the conflict:
  - When the parameter is set through the keypad, the function will not be effective after pressing the PRG key, and not enter into the next function code;
  - When the parameter is set through serial communication or HDSoft (PCTools), the drive will produce trip F021.

The commonly used settings of P03.27 are shown as below (only list low 8 bits). These can be used directly if required.

P03.27＝1 (00000001) enable

P03.27＝8 (00001000) or P03.27＝2 (00000010) run forward

P03.27＝16 (00010000) or P03.27＝34 (00100010) run reverse

P03.27＝64 (01000000) jog forward

P03.27＝128 (10000000) jog reverse

For serial communications refer to chapter 4 MODBUS communication.

P03.29	Reserved				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P03.30	Reverse running indicator				
Coding	RW	US	PT	ND	PS
			■	■	■
Range	0～1				
Change mode	Actual				

The parameter is used to indicate if the driver is running reverse or not

0: Running forward

1: Running reverse

2.4 Menu P04: Preset and PLC

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P04.01	Preset1	Min. frequency～Max. frequency	0.01Hz	5.00Hz	Run&Stop	0190H
P04.02	Preset 2		0.01Hz	10.00Hz	Run&Stop	0191H
P04.03	Preset 3		0.01Hz	20.00Hz	Run&Stop	0192H
P04.04	Preset 4		0.01Hz	30.00Hz	Run&Stop	0193H
P04.05	Preset 5		0.01Hz	40.00Hz	Run&Stop	0194H
P04.06	Preset 6		0.01Hz	45.00Hz	Run&Stop	0195H
P04.07	Preset 7		0.01Hz	50.00Hz	Run&Stop	0196H
P04.08	Preset 8		0.01Hz	5.00Hz	Run&Stop	0197H
P04.09	Preset 9		0.01Hz	10.00Hz	Run&Stop	0198H
P04.10	Preset 10		0.01Hz	20.00Hz	Run&Stop	0199H
P04.11	Preset 11		0.01Hz	30.00Hz	Run&Stop	019AH
P04.12	Preset 12		0.01Hz	40.00Hz	Run&Stop	019BH
P04.13	Preset 13		0.01Hz	45.00Hz	Run&Stop	019CH
P04.14	Preset 14		0.01Hz	50.00Hz	Run&Stop	019DH
P04.15	Preset 15		0.01Hz	50.00Hz	Run&Stop	019EH
P04.16	Preset 16		0.01Hz	50.00Hz	Run&Stop	019FH
P04.17	PLC mode	0: disabled 1: single cycle then stop 2: single cycle and keep the last speed 3: recycle	1	0	Stop Only	01A0H
P04.18	PLC power off saving mode	0: power off without saving 1: power off with saving	1	1	Stop Only	01A1H
P04.19	PLC restart mode	0: from first step speed 1: from the step speed which is the one at last stop (trip) 2: from the speed which is the one at last stop (trip)	1	0	Stop Only	01A2H
P04.20	PLC step1 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01A3H
P04.21	PLC Step1 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01A4H
P04.22	PLC step2 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01A5H
P04.23	PLC Step2 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01A6H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P04.24	PLC step3 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01A7H
P04.25	PLC Step3 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01A8H
P04.26	PLC step4 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01A9H
P04.27	PLC Step4 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01AAH
P04.28	PLC step5 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01ABH
P04.29	PLC Step5 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01ACH
P04.30	PLC step6 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01ADH
P04.31	PLC Step6 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01AEH
P04.32	PLC step7 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01AFH
P04.33	PLC Step7 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01B0H
P04.34	PLC step8 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01B1H
P04.35	PLC Step8 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01B2H
P04.36	PLC step9 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01B3H
P04.37	PLC Step9 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01B4H
P04.38	PLC step10 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01B5H
P04.39	PLC Step10 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01B6H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P04.40	PLC step11 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01B7H
P04.41	PLC Step11 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01B8H
P04.42	PLC step12 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01B9H
P04.43	PLC Step12 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01BAH
P04.44	PLC step13 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01BBH
P04.45	PLC Step13 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01BCH
P04.46	PLC step14 running time	0.0～6553.5	0.1s	0.0	Run&Stop	01BDH
P04.47	PLC Step14 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01BEH
P04.48	PLC step15 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01BFH
P04.49	PLC Step15 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01C0H
P04.50	PLC step16 running time	0.0s～6553.5s	0.1s	0.0	Run&Stop	01C1H
P04.51	PLC Step16 Accel./ Decel. Rate selector	0: Accel./Decel. Rate 1 1: Accel./Decel. Rate 2 2: Accel./Decel. Rate 3 3: Accel./Decel. Rate 4	1	0	Run&Stop	01C2H
P04.52	PLC running time unit	0: second 1: hour	1	0	Run&Stop	01C3H
P04.53	PLC finished indicator	0: not finished 1: finished	1	Actual	Actual	01C4H
P04.54	PLC recycle mode indicator	0: no-recycle 1: recycle	1	Actual	Actual	01C5H

Simple PLC running function and MS (multi section) speed running are used for realizing the drive's variable speed running according to certain regulations. For MS (multi section) speed running, the switching of multi-frequency and the change of running direction is realized through external control terminals and different combination of FWD and REV. For Simple PLC running function, not only one circulating Multi-frequency can be defined in function codes, but also the Multi-frequency running time, direction and circulation times can also be defined in function codes.

One cycle of PLC running diagram is shown in Figure 2-4-1.

- Setup frequency of f1～f16 is defined in function code P04.01～P04.16.
- a1 to a16 is acceleration process for each phase and d1 to d16 is deceleration process for each phase. T1 to T16 is each phase's running time. Please refer to the explanation of parameters P04.20 to P04.51.
- When one cycle of PLC running finishes, it can be indicated by digital output terminals or relay output signal. Refer to the explanation of P04.53.

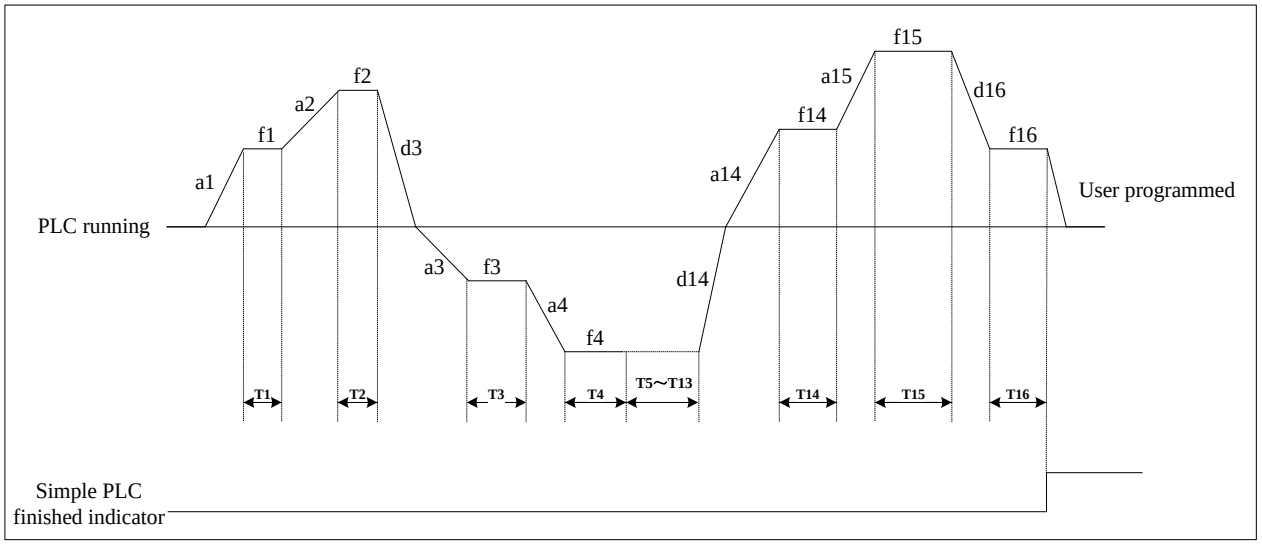


Figure 2-4-1 Simple PLC running

P04.01	**Preset1**				
P04.02	**Preset2**				
P04.03	**Preset3**				
P04.04	**Preset4**				
P04.05	**Preset5**				
P04.06	**Preset6**				
P04.07	**Preset7**				
P04.08	**Preset8**				
P04.09	**Preset9**				
P04.10	**Preset10**				
P04.11	**Preset11**				
P04.12	**Preset12**				
P04.13	**Preset13**				
P04.14	**Preset14**				
P04.15	**Preset15**				
P04.16	**Preset16**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	Min. frequency～Max. frequency				
Default	Refer to Menu P04 table				
Change mode	Run&Stop				

P01.01 (P00.04) =5 (serial communication), setup frequency is defined by parameter P04.01.

P04.17	PLC mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～3				
Default	0				
Change mode	Run&Stop				

- Set P04.17＝0, disable PLC function.
- Set P04.17＝1, stop after single PLC cycle as below.

  As the figure, VFD will stop after a PLC cycle. Restart needs one more RUN command.

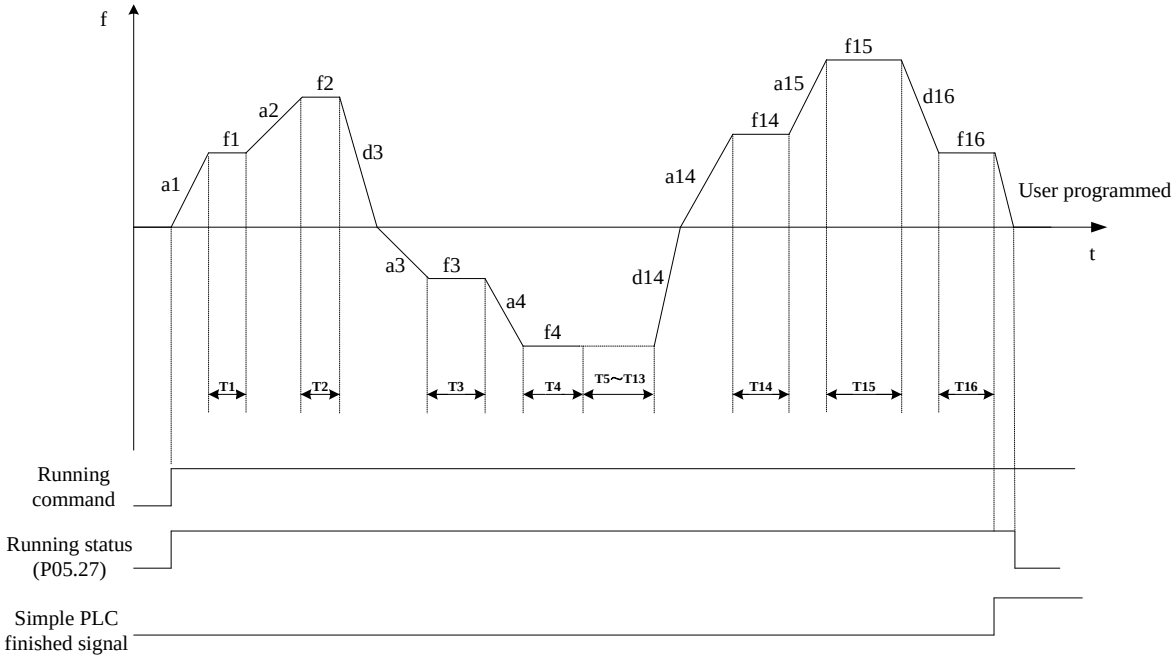


Figure 2-4-2 Stop after a PLC cycle PLC

- Set P04.17＝2, stay at the last reference after one cycle.

  As the figure, VFD will keep the frequency and direction after a PLC cycle.

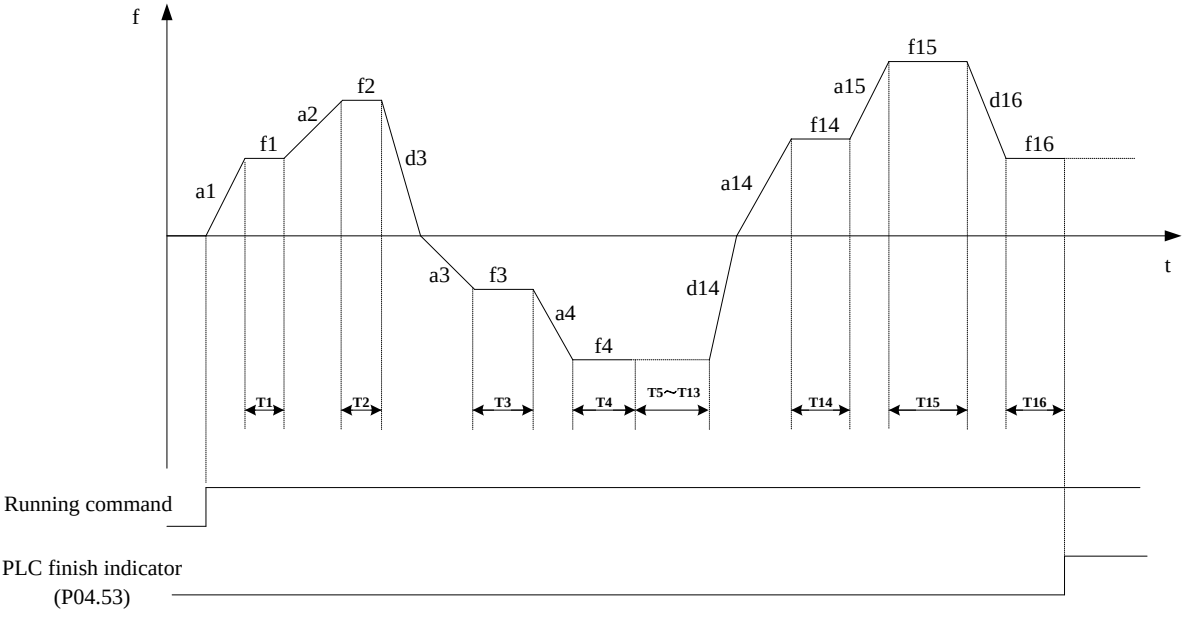


Figure 2-4-3 Stay at the last reference after one PLC cycle

- Set P04.17＝3, continue the cycles.
  As the figure, VFD always starts a new cycle after cycles until a STOP command.

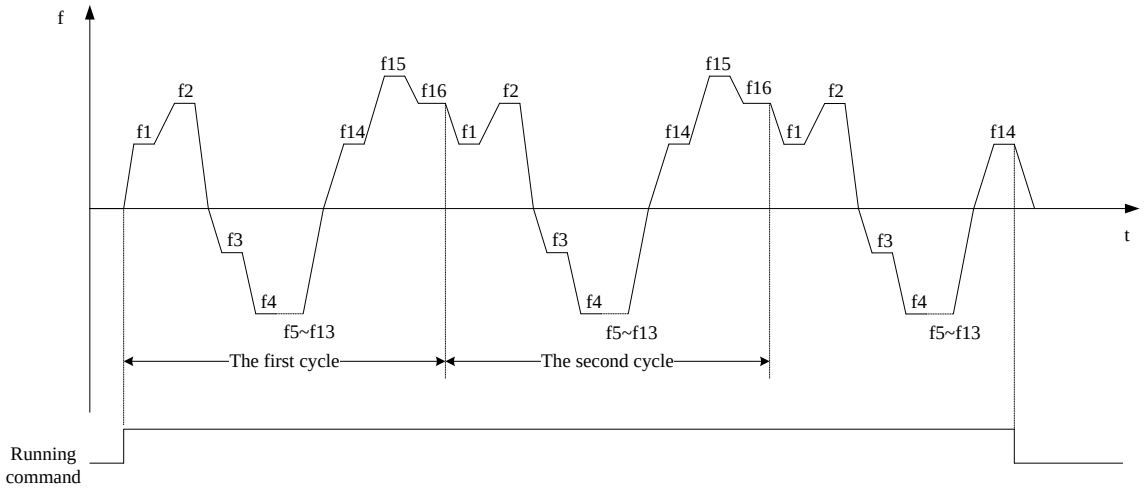


Figure 2-4-4 PLC continuous cycle

P04.18	PLC power off saving mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: power off without saving 1: power off with saving				
Default	1				
Change mode	Run&Stop				

0: power off without saving

VFD does not store the PLC state when power off and restart from preset1 after RUN command valid when power on again.

1: power off with saving

VFD stores the PLC state including running frequency, etc. when power off.

P04.19	PLC restart mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: from first step speed 1: from the step speed which is the one at last stop (trip) 2: from the speed which is the one at last stop (trip)				
Default	0				
Change mode	Run&Stop				

- Set P04.19＝0, restart from first step speed

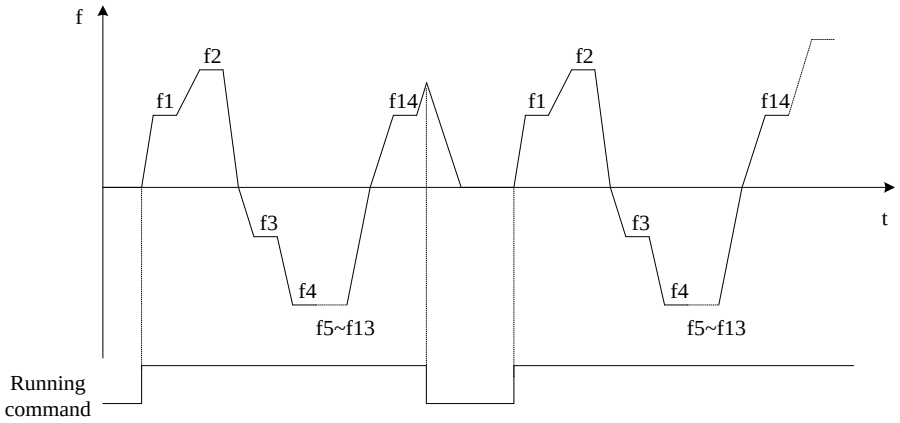


Figure 2-4-5 Restart from first step speed

- Set P04.19＝1, restart from the step speed which is the one at last stop (trip)

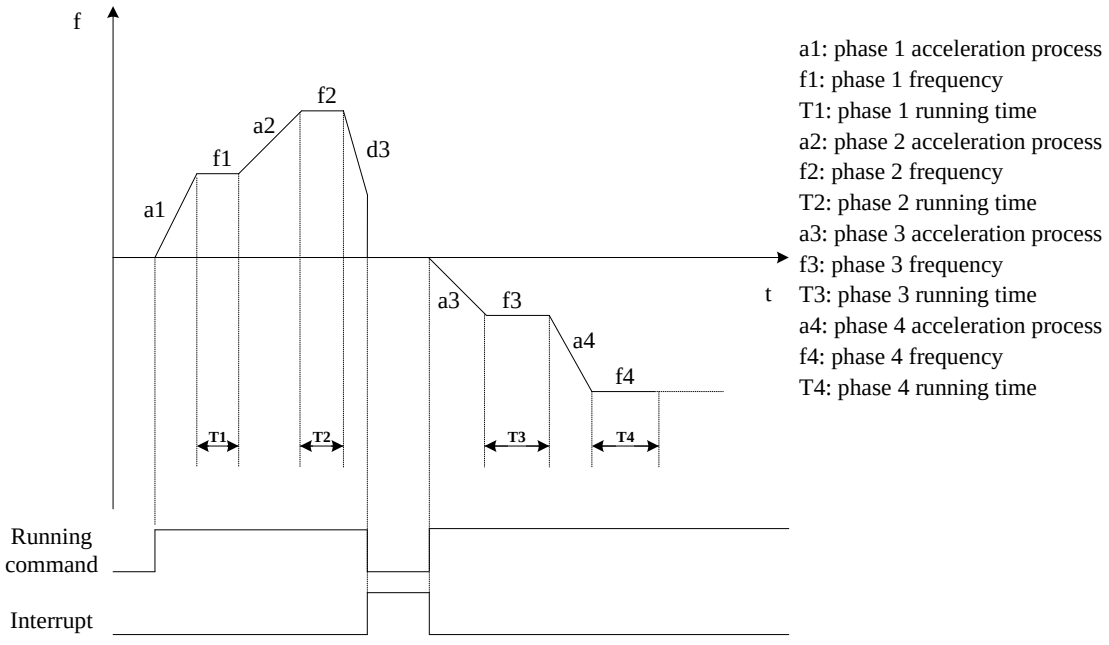


Figure 2-4-6 Restart from the step speed that is the one at last stop (trip)

- Set P04.19＝2, restart from the speed which is the one at last stop (trip)

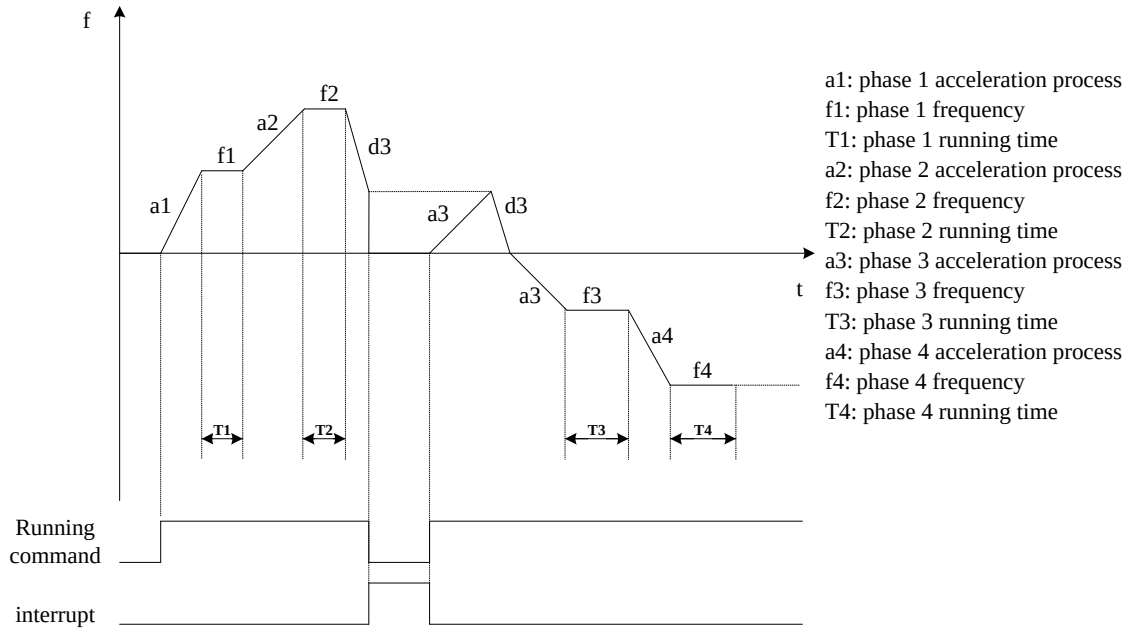


Figure 2-4-7 Restart from the speed that is the one at last stop (trip)

NOTE:

- The difference between mode1 & mode2 is that mode2 stores the frequency when power off, and VFD restarts from this frequency, while mode1 not.
- PLC running is limited by start frequency (P03.06).

P04.20	**PLC step1 running time**				
P04.22	**PLC step2 running time**				
P04.24	**PLC step3 running time**				
P04.26	**PLC step4 running time**				
P04.28	**PLC step5 running time**				
P04.30	**PLC step6 running time**				
P04.32	**PLC step7 running time**				
P04.34	**PLC step8 running time**				
P04.36	**PLC step9 running time**				
P04.38	**PLC step10 running time**				
P04.40	**PLC step11 running time**				
P04.42	**PLC step12 running time**				
P04.44	**PLC step13 running time**				
P04.46	**PLC step14 running time**				
P04.48	**PLC step15 running time**				
P04.50	**PLC step16 running time**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～6553.5s				
Default	0.0s				
Change mode	Run&Stop				

The parameters above set the time for PLC preset running stably.

NOTE: Set “0.0”, means that the corresponding preset is invalid.

P04.21	PLC step1 acceleration/deceleration rate selector				
P04.23	PLC step2 acceleration/deceleration rate selector				
P04.25	PLC step4 acceleration/deceleration rate selector				
P04.27	PLC step5 acceleration/deceleration rate selector				
P04.29	PLC step6 acceleration/deceleration rate selector				
P04.31	PLC step7 acceleration/deceleration rate selector				
P04.33	PLC step8 acceleration/deceleration rate selector				
P04.35	PLC step9 acceleration/deceleration rate selector				
P04.37	PLC step10 acceleration/deceleration rate selector				
P04.39	PLC step11 acceleration/deceleration rate selector				
P04.41	PLC step12 acceleration/deceleration rate selector				
P04.43	PLC step13 acceleration/deceleration rate selector				
P04.45	PLC step14 acceleration/deceleration rate selector				
P04.47	PLC step15 acceleration/deceleration rate selector				
P04.49	PLC step16 acceleration/deceleration rate selector				
P04.51	PLC step17 acceleration/deceleration rate selector				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: acceleration/deceleration rate 1 1: acceleration/deceleration rate 2 2: acceleration/deceleration rate 3 3: acceleration/deceleration rate 4				
Default	0				
Change mode	Run&Stop				

0: corresponds to P02.04 and P02.05;

1: corresponds to P02.06 and P02.07;

2: corresponds to P02.08 and P02.09;

3: corresponds to P02.10 and P02.11;

P04.52	PLC running time unit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: s 1: H				
Default	0				
Change mode	Run&Stop				

When P04.52=0, Each phase's running time is recorded by second.

When P04.52=1, Each phase's running time is recorded by hour.

P04.53	PLC finished indicator				
P04.54	PLC recycle mode indicator				
Coding	RW	US	PT	ND	PS
			■		
Range	0～1				
Change mode	Actual				

When simple PLC running is finished, P04.53=1.

When simple PLC is cycle running, P04.54=1.

2.5 Menu P05: Keypad and display

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P05.01	Normal keypad display select	P01.01～P18.08	0.01	P05.11	Run&Stop	01F4H
P05.02	Keypad cycle display mode	0～2	1	0	Run&Stop	01F45H
P05.03	Parameter display range control	0: only menu P00 1: all menus parameters 2: only parameters which setup is different with default	1	0	Run&Stop	01F6H
P05.04	Parameter cloning	0: no action 1: cloning up to Keypad 2: cloning down to the drive	1	0	Stop Only	01F7H
P05.05	LCD language	0: Chinese 1: English 2: reserved	1	0	Run&Stop	01F8H
P05.06	Keypad Lock control	0: unlock 1: all keys are locked 2: except RUN&STOP, all other keys are locked	1	0	Run&Stop	01F9H
P05.07	MF key function select	0: Jog 1: FWD/REV 2: Coasting Stop 3: reserved	1	0	Run&Stop	01FAH
P05.08	Motor speed	−18000rpm～+18000rpm	1rpm	Actual	Actual	01FBH
P05.09	Factor for load speed	0.1%～1000.0%	0.1%	100.0%	Run&Stop	01FCH
P05.10	Mechanical load speed	−180000rpm～+180000rpm	1rpm	Actual	Actual	01FDH
P05.11	Output frequency	−max. frequency～+max. frequency	0.01Hz	Actual	Actual	01FEH
P05.12	Output voltage	0V～drive rated voltage	1V	Actual	Actual	01FFH
P05.13	DC voltage	200V: 230V～415V 400V: 250V～830V 690V: 400V～1190V	1V	Actual	Actual	0200H
P05.14	Output current	0.0A～3×Motor rated current	0.1A	Actual	Actual	0201H
P05.15	Torque current	−3×motor rated current～3×motor rated current	0.1A	Actual	Actual	0202H
P05.16	Magnetizing current	0.0A～3×Motor rated current	0.1A	Actual	Actual	0203H
P05.17	Output power	0.0%～300.0% (refer to motor rated power)	0.1%	Actual	Actual	0204H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P05.18	Running time log: year. day	0.000～9.364 year. day	0.001year.date	Actual	Actual	0205H
P05.19	Running time log: hour. minute	0.00～23.59hour.minute	0.01hour.minute	Actual	Actual	0206H
P05.20	Energy meter: MWh	0.0MWh～999.9MWh	0.1MWh	Actual	Actual	0207H
P05.21	Energy meter: kWh	0.00kWh～99.99kWh	0.01kWh	Actual	Actual	0208H
P05.22	Electric price/kWh	0.0～0.99 (currency/kWh)	0.01 (currency/kWh)	0.00	Run&Stop	0209H
P05.23	Energy meter reset	0: no action 1: reset	1	0	Run&Stop	020AH
P05.24	Average running cost	0～10000 (currency/hour)	1 (currency/hour)	Actual	Actual	020BH
P05.25	Heatsink temperature	−25℃～127℃	1℃	Actual	Actual	020CH
P05.26	IGBT junction temperature	−25℃～200℃	1℃	Actual	Actual	020DH
P05.27	Drive is active	0: drive is at ready or trip stage 1: drive is running	1	Actual	Actual	020EH
P05.28	Rated load is on	0: output current is less than motor rated current 1: output current equals motor rated current	1	Actual	Actual	020FH
P05.29	Control MCU software version	0.00～99.99	0.01	−	Actual	0210H
P05.30	Power MCU software version	0.00～99.99	0.01	−	Actual	0211H
P05.31	LCD software version	0.00～99.99	0.01	−	Actual	0212H
P05.32	Brigde rectifier software version	0.00～99.99	0.01	−	Actual	0213H

P05.01	Normal keypad display select				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P01.01～P18.08				
Default	P05.11				
Change mode	Run&Stop				

P05.01 defines the content of Keypad (display mode).

P05.02	Keypad cycle display mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～2				
Default	0				
Change mode	Run&Stop				

0: Normal dispaly is the value of the parameter which is selected by the P05.01; default is output frequency (value of P05.11).

HD700 has a quick display group, switchover value is: output frequency, reference frequency, output current, output voltage, DC bus voltage. Operation procedure is as figure 2-5-1:

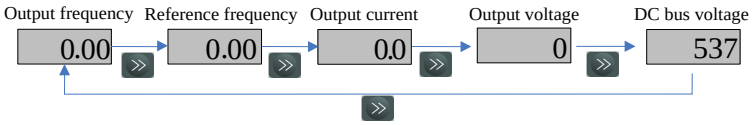


Figure 2-5-1 Display switchover flow

1: On standby mode, normal display is reference frequency. Operation procedure is as figure 2-5-2:

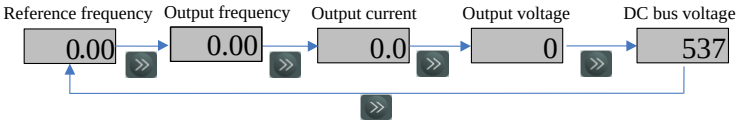


Figure 2-5-2 Display switchover flow

On running mode, normal display is output frequency. Operation procedure is as figure 2-5-3:

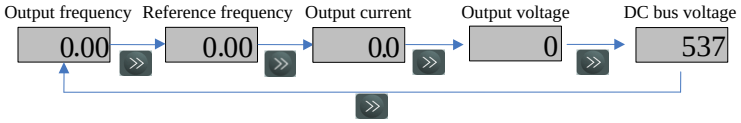


Figure 2-5-3 Display switchover flow

2: Reserved

P05.03	Parameter display range control (P00.02)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: only menu P00 1: all menus parameters 2: only parameters which setup is different with default				
Default	0				
Change mode	Run&Stop				

P05.04	Parameter cloning				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: no action 1: cloning up to Keypad 2: cloning down to the drive				
Default	0				
Change mode	Stop Only				

0: no action

1: cloning up to Keypad

If the parameter is set to 1, the drive automatically performs the value of P01.01 to P18.08 save to its internal EEPROM.

2: cloning down to the drive

If the parameter is set to 2, the values of P01.01 to P18.08 that are cloned up to keypad are automatically loaded to the drive.

NOTE:

- P05.04 is set back to 0 after cloning parameters.
- Only the parameters with US attribution can be cloned.
- Before cloning down to the drive from Keypad, cloning up to Keypad from the drive is necessary. After cloning up to Keypad from the drive, the parameters are stored in EEPROM on Keypad forever.
- Before cloning down to the drive from Keypad, the drive checks the version and integrality of parameters from Keypad at first, and then trips if some errors occur such as parameters being empty, or some parameter lacked, or version different.
- Cloning down to drive from Keypad can be operated many times for the parameter existed in EEPROM on Keypad.

P05.05	LCD language				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: Chinese 1: English 2: Reserved				
Default	0				
Change mode	Run&Stop				

The parameter is used to select the language of LCE keypad displaying.

NOTE: This function is effective only for LCD keypad.

P05.06	Keypad lock control				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: unlock 1: all keys are locked 2: except RUN&STOP, all other keys are locked				
Default	0				
Change mode	Run&Stop				

The parameter is used to select if the keys are locked or not.

Keypad lock function enable: set P05.06 > 0, press PRG key and then the keys are locked.

Keys unlocked operation: press the ESC key more than 5 seconds, the value of P05.06 to be automatic recovery is 0, and the keyboard is unlocked. When unlock the keys, parameter P05.07 will flash once on the keypad.

P05.07	MF key function select				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: Jog 1: FWD/REV 2: Coasting Stop 3: Reserved				
Default	0				
Change mode	Run&Stop				

The parameter is used to define the specific function of MF key.

P05.08	Motor speed				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−18000rpm～+18000rpm				
Change mode	Actual				

The parameter is used to display the actual motor speed.

NOTE: There is a 5-digit LED display on the HD700 Drive standard keypad. When motor speed is less than or equal to −10000rpm, the highest decimal point means a minus.

For example:

18000rpm is shown as 18000

−8000rpm is shown as −8000

−18000rpm is shown as 1.8000

P05.09	Factor for load speed				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.1%～1000.0%				
Default	100.0%				
Change mode	Run&Stop				

Set load speed ratio (transmission ratio) according to different load transmission ratio. Setting the correct load speed ratio can load properly load speed.

P05.10	Mechanical load speed				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−180000rpm～+180000rpm				
Change mode	Actual				

The actual load speed: P05.10=P05.09×P05.08

NOTE: There is a 5-digit LED display on the HD700 Drive standard keypad. When load speed is less than or equal to −10000rpm, the highest decimal point represents a minus. When load speed is less than −100000rpm, the decimal point indicates a minus and the lowest order hided. When load speed more than 100000rpm, the decimal point indicates the lowest order hided.

For example:

18123rpm is shown as 18123

175426rpm is shown as 1754.2

−8123rpm is shown as −8123

−18123rpm is shown as 1.8123

−175426rpm is shown as 17.542

The parameter cannot be read and written in serial communications mode.

P05.11	Output frequency				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−max. frequency～+max. frequency				
Change mode	Actual				

P05.12	Output voltage				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0V～drive rated voltage				
Change mode	Actual				

The parameter is used to define the effective value of fundamental voltage.

P05.13	DC voltage				
Coding	RW	US	PT	ND	PS
			■	■	
Range	200V: 230～415V 400V: 250～830V 690V: 400～1190V				
Change mode	Actual				

The parameter is used to define the value of drive DC busbar voltage.

P05.14	Output current				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0.0A～3×motor rated current				
Change mode	Actual				

The parameter is used to define drive output current.

P05.15	Torque current				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−3×motor rated current～3×motor rated current				
Change mode	Actual				

P05.16	Magnetizing current				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0.0A～3×motor rated current				
Change mode	Actual				

P05.17	Output power				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0.0%～300.0% (refer to motor rated power)				
Change mode	Actual				

The parameter is used to monitor drive output power refer to the percentage of motor rated power.

P05.18	Running time log: year. date				
Coding	RW	US	PT	ND	PS
			■	■	■
Range	0.000～9.364 year. date				
Change mode	Actual				

The parameter is used to record the drive running time log after the drive delivery.

P05.19	Running time log: hour. minute				
Coding	RW	US	PT	ND	PS
			■	■	■
Range	0.00～23.59 hour. minute				
Change mode	Actual				

P05.20	Energy meter: MWh				
Coding	RW	US	PT	ND	PS
			■	■	■
Range	0.0 MWh～999.9MWh				
Change mode	Actual				

P05.21	Energy meter: kWh				
Coding	RW	US	PT	ND	PS
			■	■	■
Range	0.00kWh～99.99kWh				
Change mode	Actual				

Energy meter indicates the energy value of drive supplied (unit: kWh, MWh). P05.20 and P05.21 indicate the accumulated value of drive output frequency.

When P05.23=1, the energy meter is reset to be 0.

P05.22	Electric price/kWh				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0～0.99 (currency/kWh)				
Default	0.00				
Change mode	Run&Stop				

P05.23	Energy meter reset				
Coding	RW	US	PT	ND	PS
	■				
Range	0～1				
Default	0				
Change mode	Run&Stop				

When P05.23=1, the energy meter is reset to be 0.

P05.24	Average running cost				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−0～10000 (currency/hour)				
Change mode	Actual				

If set P05.22 correctly, the parameter indicates drive every hour running cost.

P05.25	Heatsink temperature				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−25℃～127℃				
Change mode	Actual				

P05.26	IGBT junction temperature				
Coding	RW	US	PT	ND	PS
				■	
Range	−25℃～200℃				
Change mode	Actual				

The IGBT junction temperature is calculated using heatsink temperature (P05.25) and a thermal model of the drive power stage. The resulting temperature is displayed in this parameter. The calculated IGBT junction temperature is used to modify the drive switching frequency to reduce losses if the devices become too hot.

P05.27	Drive is active				
P05.28	Rated load is on				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0～1				
Change mode	Actual				

P05.29	Control MCU software version				
P05.30	Power MCU software version				
P05.31	LCD software version				
P05.32	Brigde rectifier software version				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0.00～99.99				
Change mode	Actual				

The drive software version consists of two numbers xx.yy that are displayed in these parameters. Where xx specifies a change that affects hardware compatibility, yy specifies a change that affects product documentation.

Plug the LED keyboard in, P05.31 displays 0.

2.6 Menu P06: V/F controls parameters

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P06.01	V/F control mode	0: user programmed V/F ramp 1: 2 law ramp 2: 1.7 law ramp 3: 1.2 law ramp	1	0	Stop Only	0258H
P06.02	V/F frequency 3	(P06.04)～(P13.08)	0.01Hz	0.00Hz	Stop Only	0259H
P06.03	V/F voltage3	(P06.05)～100.0%	0.1%	0.0%	Stop Only	025AH
P06.04	V/F frequency 2	(P06.06)～(P06.02)	0.01Hz	0.00Hz	Stop Only	025BH
P06.05	V/F voltage 2	(P06.07)～(P06.03)	0.1%	0.0%	Stop Only	025CH
P06.06	V/F frequency 1	0.00～(P06.04)	0.01Hz	0.00Hz	Stop Only	025DH
P06.07	V/F voltage 1	0～(P06.05)	0.1%	0.0%	Stop Only	025EH
P06.08	Voltage boost	0.0%～30.0%	0.1%	By model	Run&Stop	025FH
P06.09	Boost finish frequency	0.0%～50.0%	0.1%	50.0%	Run&Stop	0260H
P06.10	Stable factor control	0: off 1: on	1	0	Run&Stop	0261H
P06.11	Auto energy saving control	0: off 1: on	1	0	Stop Only	0262H
P06.12	AVR control	0: off 1: on for all condition 2: on except ramp	1	1	Stop Only	0263H

NOTE: (Pxx.xx) means the value of Pxx.xx.

P06.01	V/F control mode (P00.23)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0:user programmed V/F ramp 1: 2 law ramp 2: 1.7 law ramp 3: 1.2 law ramp				
Default	0				
Change mode	Stop Only				

Different V/F characteristic is defined by P06.01 (P00.23) to meet the demanding from different load.

There are three kinds of fixed curve and one user programmed line

When P06.01 (P00.23) is 1, it is a 2.0 law ramp, curve1 in figure 2-6-1.

When P06.01 (P00.23) is 2, it is a 1.7 law ramp, curve2 in figure 2-6-1.

When P06.01 (P00.23) is 3, it is a 1.2 law ramp, curve3 in figure 2-6-1.

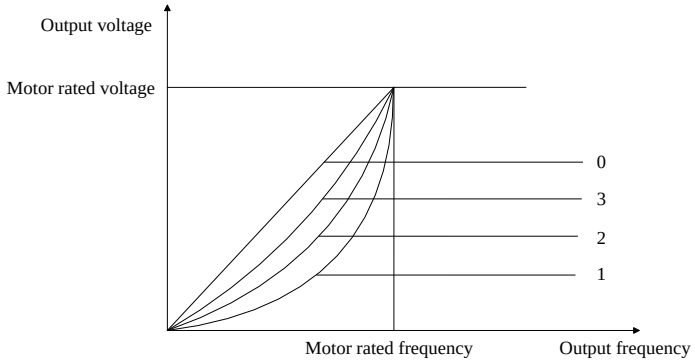
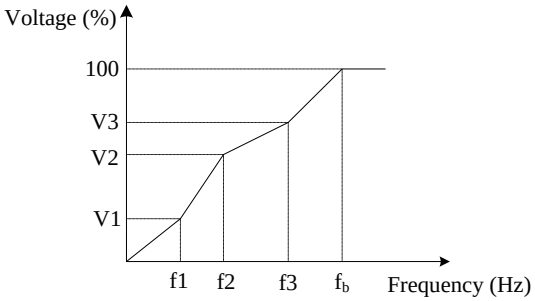


Figure 2-6-1 Motor V/F curve

P06.02	V/F frequency 3				
P06.04	V/F frequency 2				
P06.06	V/F frequency 1				
Coding	RW	US	PT	ND	PS
	■	■			
Range	P06.04≤P06.02≤P13.08, P06.06≤P06.04≤P06.02, 0.00≤P06.06≤P06.04				
Default	0.00Hz				
Change mode	Stop Only				

P06.03	V/F voltage 3				
P06.05	V/F voltage 2				
P06.07	V/F voltage 1				
Coding	RW	US	PT	ND	PS
	■	■			
Range	P06.05≤P06.03≤100.0%, P06.07≤P06.05≤P06.03, 0≤P06.07≤P06.05				
Default	0.0%				
Change mode	Stop Only				

When P06.01 is set to 0, the user can set up the parameters P06.02～P06.07 to define the V/F curve, by add three points (V1, f1), (V2, f2), (V3, f3) on the V/F curve showed as below, this can improve the performance during the acceleration under specific application situation, under default set up, the V/F is a straight line.



f_b: motor rated frequency

Figure 2-6-2 V/F curve defined by user

P06.08	Voltage boost (P00.22)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0.0%～30.0%				
Default	By model				
Change mode	Run&Stop				

The parameter is used to compensate the low frequency voltage. In order to compensate V/F control low frequency voltage boost characteristic, compensate the drive output voltage. If the voltage boost is set too great, the motor is easy to overheat and the drive will produce overcurrent. Adjusting the parameter correctly will protect the drive from overcurrent when the drive starts. It is better to increase the parameter setting value for heavy load, otherwise decrease the parameter setting value. When P06..08 is set to 0.0%, the voltage boost is disabled.

The parameter is used with P06.09 (boost finish frequency) together. When P06.09=0, the voltage boost is disabled. When P06.09≠0, the voltage boost is active if the output frequency is less than the boost finish frequency; the voltage boost is disabled if the output frequency exceeds the boost finish frequency. The default of P06.09 is 50% (refer to motor rated frequency).

The default of P06.08 is dependent on the drive power as given in the table below:

Table 2-6-1 the default value of voltage boost

Drive power	Default
0.4kW～4kW	3.0%
5.5kW～15kW	2.0%
18.5kW～37kW	1.0%

Drive power	Default
45kW～75kW	0.5%
90kW above	0.0%

P06.09	Boost finish frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～50.0%				
Default	50.0%				
Change mode	Run&Stop				

Refer to the explanation of P06.08.

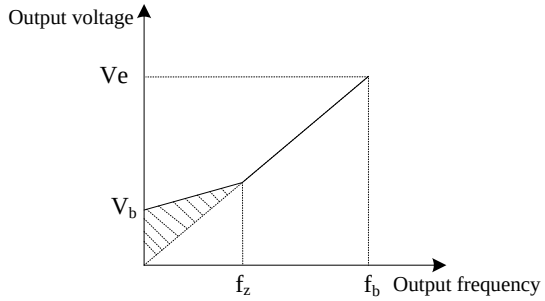


Figure 2-6-3 Voltage boost

Ve: motor rated voltage

V_b: boost voltage=V_e×P06.08 (P00.22)

f_z: boost close frequency (P06.09)

f_b: motor rated frequency

P06.10	Stable factor control				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

P06.11	Auto energy saving control				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

P06.12	AVR control				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: off 1: on for all condition 2: on except ramp				
Default	1				
Change mode	Run&Stop				

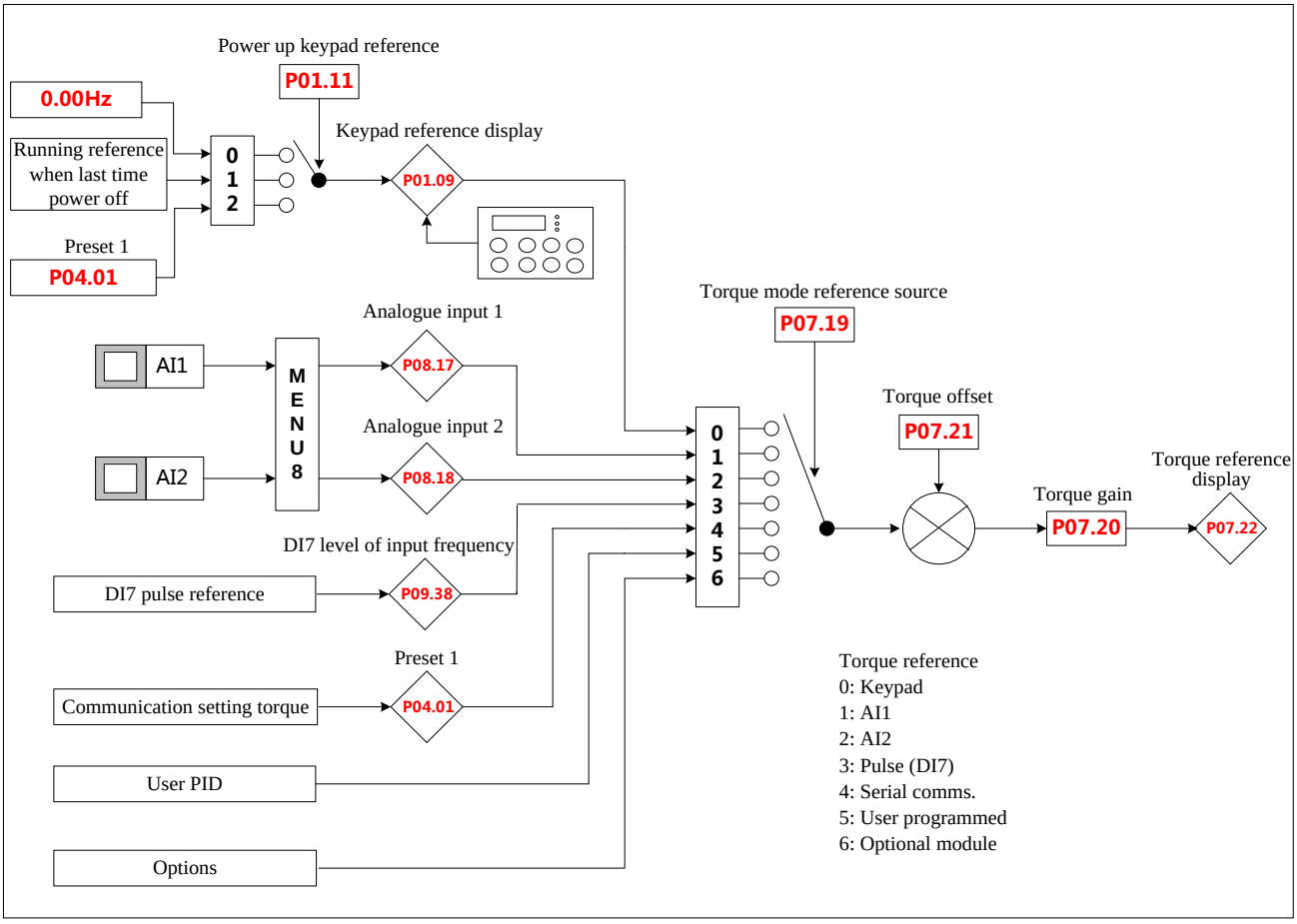
AVR is auto voltage regulation. When the drive's input voltage differs with the rated input voltage, the drive's output voltage can be stabilized by adjusting the width of PWM wave.

This function is usually enabled, especially when the input voltage is higher than the rated input voltage.

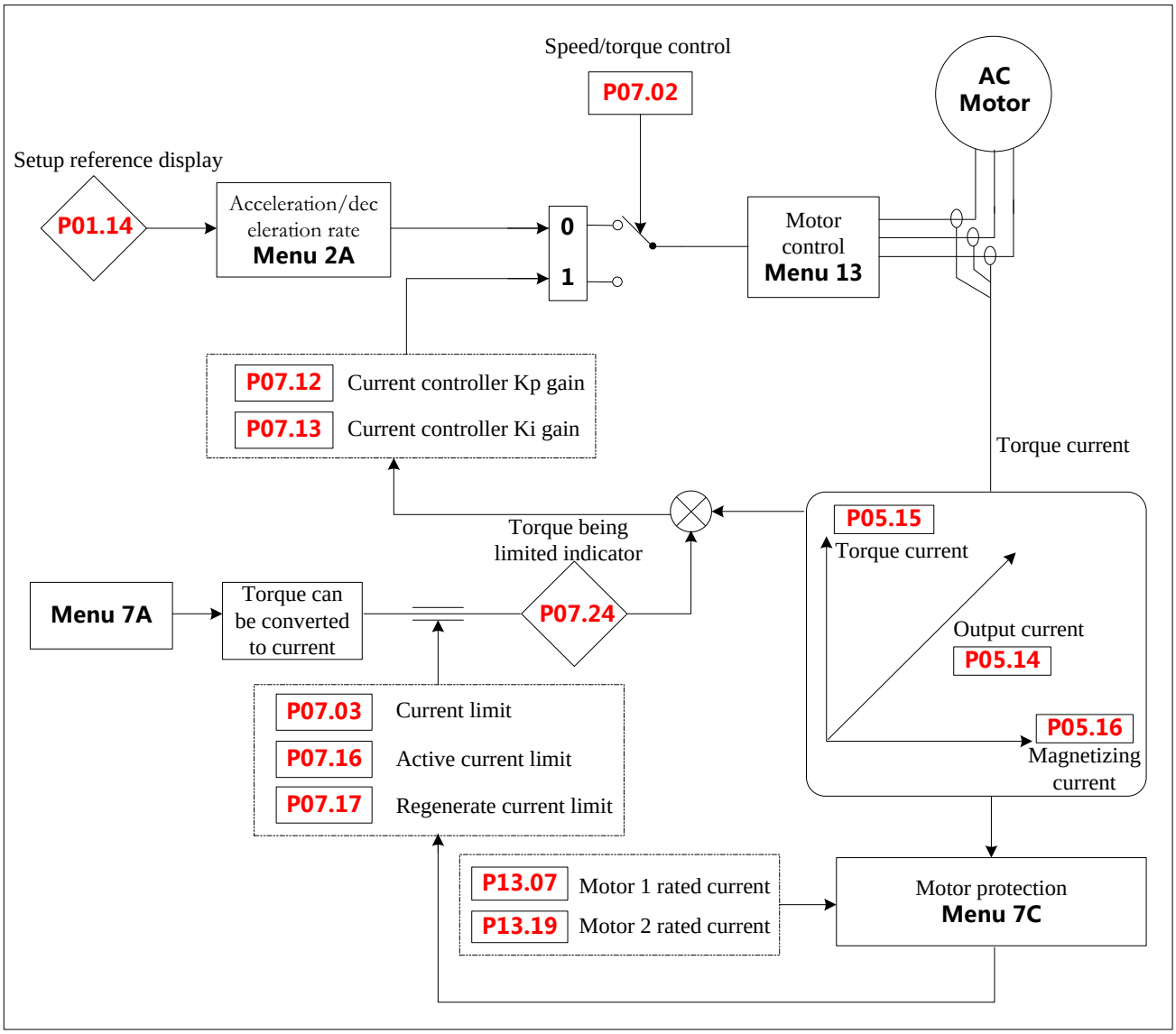
2.7 Menu P07: Vector

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P07.01	Speed/Torque mode change condition	0: only stop 1: Run&stop	1	0	Run&Stop	02BCH
P07.02	Speed/Torque control selector	0: speed 1: torque	1	0	Run&Stop	02BDH
P07.03	Current limit	0.0%～300.0%	0.1%	200.0%	Run&Stop	02BEH
P07.04 ～ P07.11	Reserved	–	–	–	–	–
P07.12	Current controller Kp gain	0.001～10. 000	0.001	0.020	Run&Stop	02C7H
P07.13	Current controller Ki gain	0.00s～100. 00s	0.01s	0.20s	Run&Stop	02C8H
P07.14	Current limit protection	0: Enable current limit protection 1: Disable current limit protection above fundamental frequency 2: Current limit protection disabled at fast increase or decrease 3: Both disabled	1	0	Stop Only	02C9H
P07.15	Slip compensation error	0rpm～1500rpm	1rpm	0rpm	Run&Stop	02CAH
P07.16	Active current limit	0.0％～300.0％	0.1%	200.0%	Run&Stop	02CBH
P07.17	Regen. Current limit	0.0％～300.0％	0.1%	150.0%	Run&Stop	02CCH
P07.18	Maximum speed under torque mode	0.00Hz～1.2×P01.02	0.01Hz	50.00Hz	Run&Stop	02CDH
P07.19	Torque mode reference source	0: Keypad 1: AI1 2: AI2 3: Pulse (DI7) 4: Serial communications 5: User programmed 6: option module	1	1	Stop Only	02CEH
P07.20	Torque gain	0.0%～300.0%	0.1%	100.0%	Run&Stop	02CFH
P07.21	Torque offset	0.0%～100.0%	0.1%	0.0%	Run&Stop	02D0H
P07.22	Torque reference display	−300.0%～+300.0%	0.1%	Actual	Actual	02D1H
P07.23	Reserved	–	–	–	–	–
P07.24	Torque being limited indicator	0: not limited 1: being limited	1	Actual	Actual	02D3H

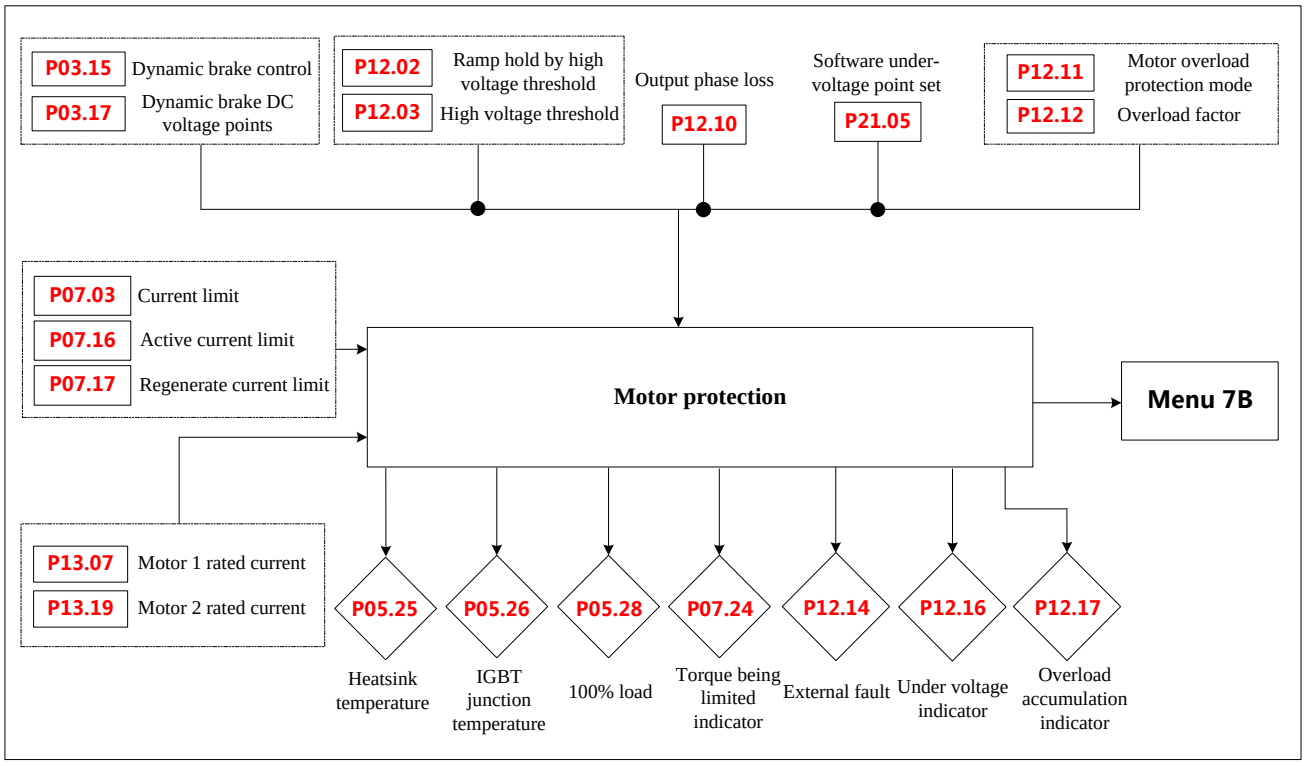
Menu 7A Logic diagram



Menu 7B Logic diagram



Menu 7C Logic diagram



P07.01	Speed/torque mode change condition				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	0				
Change mode	Run&Stop				

The parameter is used to control whether changing the value of P07.02 (speed/torque control mode) is allowed when the drive is running.

0: P07.02 cannot be changed during running

1: P07.02 can be changed during running

P07.02	Speed/torque control selector				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	0				
Change mode	Run&Stop				

0: speed control mode

The drive operates speed control. In speed control mode, the drive outputs frequency according to the setting frequency and output torque is automatically matched with load torque. However, output torque is limited by the upper limit of output torque (P07.03, P07.16, P07.17). When load torque is greater than the upper limit of output torque, output frequency and reference frequency are not the same.

1: torque control mode

The drive operates torque control. The drive outputs torque (current) according to torque command and output frequency is automatically matched with load. However, output frequency is limited by P07.18 (maximum speed under torque mode). When load speed is greater than the upper limit of frequency, the drive output frequency is limited and output torque is different with reference torque.

In torque control mode, select torque reference source by P07.19 (torque mode reference source). The final torque reference is affected by torque gain and torque offset. The relation between them as shown below:

Torque reference=(the value of torque mode reference source +torque offset)×torque gain

Load torque < setup torque: the output frequency rises, when it arrives at the high limit, the drive will be running at the high limit frequency.

Load torque > setup torque: the output frequency decreases, when it arrives at the low limit, the drive will be running at the low limit frequency.

P07.03	Current limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～300.0%				
Default	200.0%				
Change mode	Run&Stop				

Current limit is effective to electric/power generation torque limit. When P07.03=100%, it corresponds to motor rated current.

P07.04	**Reserved**				
P07.05	**Reserved**				
P07.06	**Reserved**				
P07.07	**Reserved**				
P07.08	**Reserved**				
P07.09	**Reserved**				
P07.10	**Reserved**				
P07.11	**Reserved**				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P07.12	**Current controller Kp gain**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.001～10. 000				
Default	0.020				
Change mode	Run&Stop				

P07.13	**Current controller Ki gain**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00s～100. 00s				
Default	0.20s				
Change mode	Run&Stop				

These parameters control the proportional and integral gains of the current controller. Increasing proportional gains or reducing integral gains can make the controller respond quickly. Proportional gains too high or integral gains too long will make the controller instable.

Adjustment method:

If the default setting is not suitable for some applications, the user can adjust the performance of the controller: ensure the controller is stable, increase proportional gains first, and then reduce integral gains to make the controller respond quickly. The controller has smaller overshoot.

P07.14	Current limit protection				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: Enable current limit protection 1: Disable current limit protection above fundamental frequency 2: Current limit protection disabled at fast increase or decrease 3: Both disabled				
Default	0: Enable current limit protection				
Change mode	Stop Only				

0: Enable current limit protection

1: Disable current limit protection above fundamental frequency

In general, when the motor is running above fundamental frequency, the current limit factor will decrease automatically according to the output frequency to keep constant power.

If P07.14=1, then current limit factor will not be changed.

2: Current limit protection disabled at fast increase or decrease

At fast increase or decrease, the drive will not alarm over current fault (F001) in a short time. In this condition, the drive will predict the value of current that can possibly arrive. If the predicting current value is larger, the drive will automatically adjust the acceleration or deceleration rate. This function is valid when the acceleration or deceleration rate is less than one second. If P07.14=2, the drive will not automatically adjust the acceleration or deceleration rate.

3: Both disabled

Note: P07.14 = 1, the current limit protection is disabled above fundamental frequency, the motor may be damaged. Please use this function carefully.

P07.15	Slip compensation error				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0rpm～1500rpm				
Default	0				
Change mode	Run&Stop				

Changing motor load torque will affect motor running slip and cause motor speed changing. When motor speed is different with the setting motor speed, the user can adjust slip compensation to realize the actual motor speed is the same with the setting motor speed.

P07.16	Active current limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～300.0%				
Default	200.0%				
Change mode	Run&Stop				

Active current limit, when the parameter is set to 100%, it corresponds to the drive rated torque.

P07.17	Regen. current limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～300.0%				
Default	150.0%				
Change mode	Run&Stop				

Regeneration current limit, when the parameter is set to 100%, it corresponds to the drive rated torque.

P07.18	Maximum speed under torque mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00～1.2×P01.02				
Default	50.00Hz				
Change mode	Run&Stop				

The parameter is used to limit the upper threshold of motor speed in torque mode.

P07.19	Torque mode reference source				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: Keypad 1: AI1 2: AI2 3: Pulse (DI7) 4: Serial communications 5: User programmed 6: option module				
Default	1				
Change mode	Stop Only				

0: keypad

Change the frequency reference through adjusting ▲ or ▼ switches, and the Power up value is decided by parameter P01.11 (P00.12).

1: AI1

In this mode, adjust torque reference by changing analogue input 1.

About AI1 signal mode, there are current mode and voltage mode.

When AI1 is selected as torque reference source, if P08.01=0 (analogue input basic application function), must set P08.03=0 (AI1 is analogue input frequency reference);

When P08.01=1 (analogue input advanced application function), muse set P08.03=P01.02 (AI2 is analogue input frequency reference).

2: AI2

In this mode, adjust torque reference by changing analogue input 2.

AI2 has only voltage mode.

When AI2 is selected as reference source for torque reference, if P08.01=1 (analogue input basic application), must set P08.08=0 (analogue input 2). If P08.01=1 (analogue input advanced application), must set P08.08=P01.21 (analogue

input 2).

About AI1 and AI2, refer to Menu P08 for details.

3: DI7 pulse input

In this mode,

4: serial communications

In this mode, the user can adjust torque reference by changing the value of P04.01 (preset1).

5: PID

In this mode, the user can adjust torque reference by changing PID output (P15.22).

6: option module

P07.20	**Torque gain**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～300.0%				
Default	100.0%				
Change mode	Run&Stop				

This parameter is used to scale the torque input if so desired.

P07.21	**Torque offset**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～100.0%				
Default	0.0%				
Change mode	Run&Stop				

An offset can be added to torque input with a range from -100% to 100%. If the sum of the input and the offset exceeds ±200%, the result is limited to ±200%.

P07.22	Torque reference display				
Coding	RW	US	PT	ND	PS
				■	
Range	−300.0%～+300.0%				
Change mode	Actual				

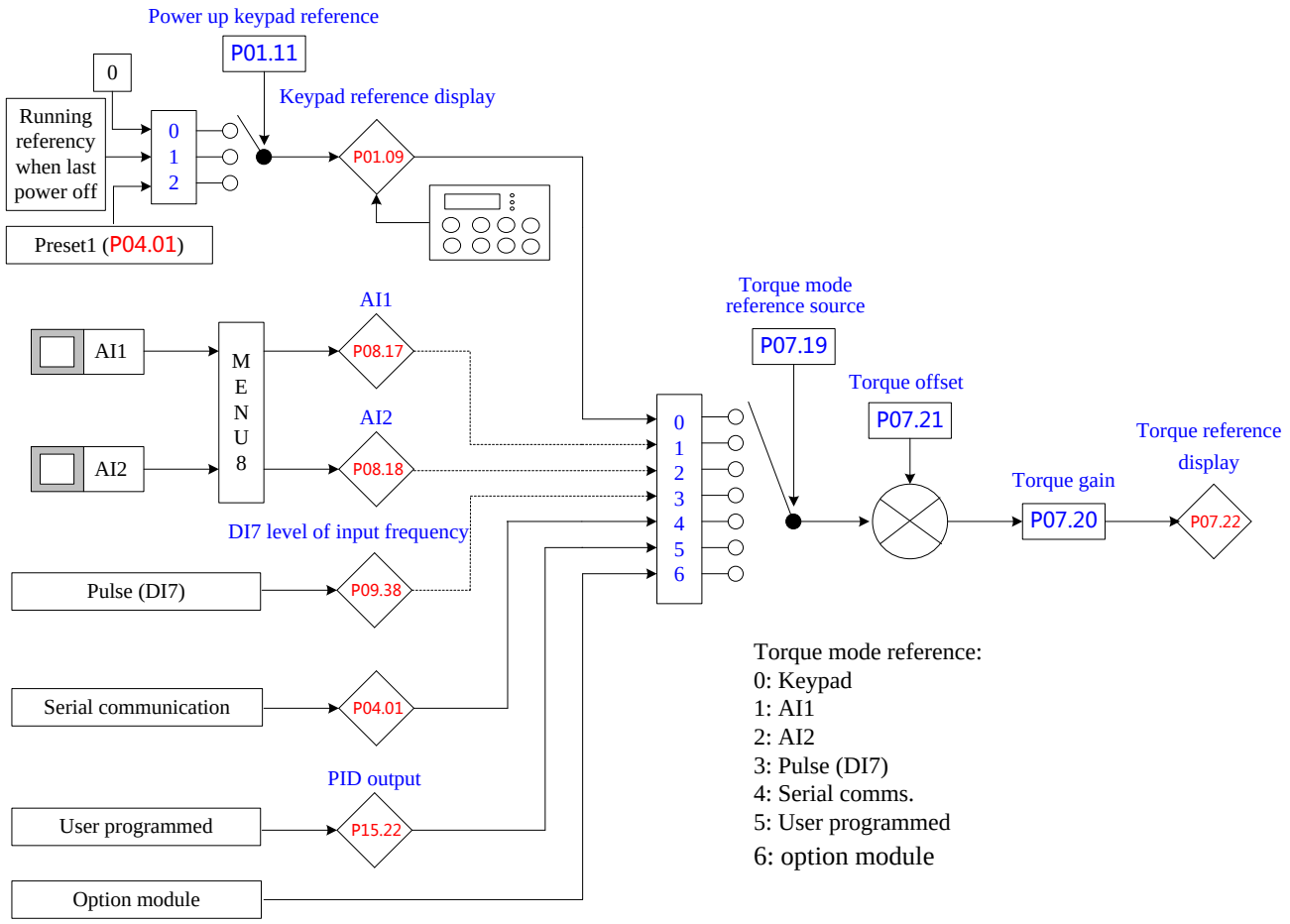


Figure 2-7-1 torque mode diagram

P07.23	Reserved				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P07.24	Torque being limited indicator				
Coding	RW	US	PT	ND	PS
			■		
Range	0: not limited 1: being limited				
Change mode	Actual				

The parameter indicates whether torque is limited. It means the current limit is enabled.

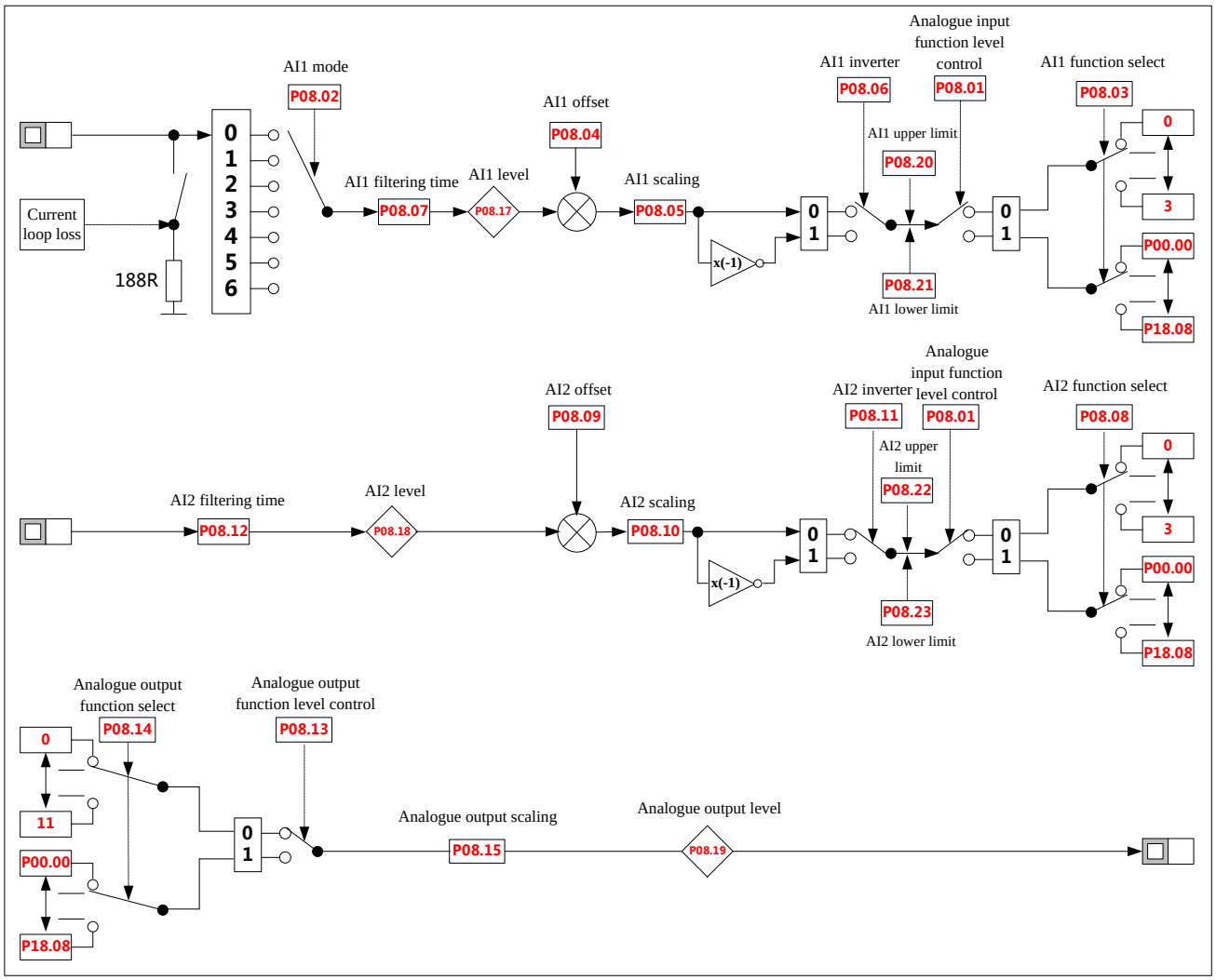
2.8 Menu P08: Analogue input and output

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P08.01	Analogue input function level control	0: P08.03 and P08.08 are only basic applications (0～3) 1: P08.03 and P08.08 are advanced applications (P00.00～P18.08)	1	0	Run&Stop	0320H
P08.02	AI1 mode	0: 0mA～20mA 1: 20mA～0mA 2: 4mA～20mA (current loosing with trip) 3: 20mA～4mA (current loosing with trip) 4: 4mA～20mA (current loosing without trip) 5: 20mA～4mA (current loosing without trip) 6: 0V～10V	1	6	Stop Only	0321H
P08.03	AI1 function select	0: analogue input1 1: speed limit (Torque control) 2: Torque offset 3: No function 99: Advanced function	1	0	Stop Only	0322H
P08.04	AI1 offset	−100.0%～+100.0%	0.1%	0.0%	Run&Stop	0323H
P08.05	AI1 scaling	0.000～20.000	0.001	1.000	Run&Stop	0324H
P08.06	AI1 inverter	0: off 1: on	1	0	Run&Stop	0325H
P08.07	AI1 filtering time	0.00s～10.00s	0.01s	0.1s	Run&Stop	0326H
P08.08	AI2 function select	0: analogue input2 1: speed limit (Torque control) 2: Torque offset 3: No function 99: Advanced function	1	0	Stop Only	0327H
P08.09	AI2 offset	−100.0%～+100.0%	0.1%	0.0%	Run&Stop	0328H
P08.10	AI2 scaling	0.000～20.000	0.001	1.000	Run&Stop	0329H
P08.11	AI2 inverter	0: off 1: on	1	0	Run&Stop	032AH
P08.12	AI2 filtering time	0.00s～10.00s	0.01s	0.1s	Run&Stop	032BH
P08.13	Analogue output function level control	0: P08.14 is only basic application (0～11) 1: P08.14 is advanced application (P00.00～P18.08)	1	0	Run&Stop	032CH

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P08.14	Analogue output function select	0: output frequency 1: reference frequency 2: active current 3: output current 4: motor speed 5: DC voltage 6: output voltage 7: AI1 level 8: AI2 level 9: length 10: counting 11: No function 99: Advanced function	1	0	Run&Stop	032DH
P08.15	Analogue output scaling	0.000～20.000	0.001	1.000	Run&Stop	032EH
P08.16	Current loosing indicator	0: no loosing 1: loosing	1	Actual	Actual	032FH
P08.17	AI1 level	0.0%～100.0%	0.1%	Actual	Actual	0330H
P08.18	AI2 level	0.0%～100.0%	0.1%	Actual	Actual	0331H
P08.19	Analogue output level	0.0%～100.0%	0.1%	Actual	Actual	0332H
P08.20	AI1 upper limit	0.0%～100.0%	0.1%	100.0%	Run&Stop	0333H
P08.21	AI1 lower limit	0.0%～P08.20	0.1%	0.0%	Run&Stop	0334H
P08.22	AI2 upper limit	0.0%～100.0%	0.1%	100.0%	Run&Stop	0335H
P08.23	AI2 lower limit	0.0%～P08.22	0.1%	0.0%	Run&Stop	0336H

NOTE: For parameters P08.03, P08.08, P08.14, when the advanced function returns to basic function, if there is no corresponding options, will display “99”, and the advanced fuction will continue to take effect.

Menu 8 Logic diagram



P08.01	Analogue input function level control				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: P08.03 and P08.08 are only basic applications (0～3) 1: P08.03 and P08.08 are advanced applications (P00.00～18.08)				
Default	0				
Change mode	Run&Stop				

HD700 analogue input terminals have basic and advanced applications function. The parameter is used to select the analogue input terminals are basic applications or advanced applications.

P08.01=0, analogue input terminals are basic applications, P08.03 and P08.08 value range is 0 to 3.

P08.01=1, analogue input terminals are advanced applications, P08.03 and P08.08 value range is P00.00 to P18.08. Refer to the explanation of P08.03 and P08.08.

P08.02	AI1 mode (P00.05)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: 0mA～20mA 1: 20mA～0mA 2: 4mA～20mA (current loosing with trip) 3: 20mA～4mA (current loosing with trip) 4: 4mA～20mA (current loosing without trip) 5: 20mA～4mA (current loosing without trip) 6: 0V～10V				
Default	6				
Change mode	Stop Only				

AI1 is a voltage/current reference input.

0: 0mA～20mA

1: 20mA～0mA

2: 4mA～20mA (current loosing with trip)

3: 20mA～4mA (current loosing with trip)

4: 4mA～20mA (current loosing without trip)

5: 20mA～4mA (current loosing without trip)

6: 0V～10V

In modes 0 to 5, if the current input is over 26mA, the drive will initiate a F012 trip and stop as the mode defined by the setting of P03.10, and then turn off the IGBTs.

In modes 2 or 3, if the current input falls below 3mA, the drive will initiate a F013 trip and stop as the mode defined by the setting of P03.10, and then turn off IGBTs.

NOTE: If in modes 2 to 5, once the current input falls below 3mA, P08.16 (current loosing indicator) is 1.

P08.03	AI1 function select				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: analogue input1 1: speed limit (Torque control) 2: Torque offset 3: No function 99: Advanced function				
Default	0				
Change mode	Stop Only				

The parameter is analogue input 1 function selector.

When P08.01=0, analogue input terminals are basic applications function. There are three applications:

- P08.03=0, AI1 is analogue input1 reference. When AI1 scaling (P08.05) and AI1 inverter (P08.06) are set to default, input range that is defined by AI1 reference (P01.20) is converted to 0.0% to 100.0%.
- P08.03=1, AI1 is speed limit in torque control mode. When AI1 scaling (P08.05) and AI1 inverter (P08.06) are set to default, input range corresponds to speed limit in torque control mode (P07.18) of 0.0% to 100.0%. 100.0% corresponds to 1.2 times of maximum frequency (P01.02).
- When P08.03=2, AI1 is torque offset. When AI1 scaling (P08.05) and AI1 inverter (P08.06) are set to default, input range corresponds to torque offset (P07.21) of 0.0% to 100.0%.

When P08.01=1, P08.03 value range is P01.01 to P18.08. It means that P08.03 can select any effective parameters to AI1 (parameters attribute allows and no conflict).

By default, when the value of P08.01 is changed to 1 from 0, P08.03 changes to P08.03=P01.20 from P08.03=0. It means P01.20 is analogue input 1 reference frequency.

P08.04	AI1 offset				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−100.0%～+100.0%				
Default	0.0%				
Change mode	Run&Stop				

An offset can be added to each analogue input with a range from -100% to 100%. If the sum of the input and the offset exceeds ±100%, the result is limited to ±100%.

The parameter defines AI1 offset.

P08.05	AI1 scaling				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.000～20.000				
Default	1.000				
Change mode	Run&Stop				

This parameter is used to scale the analogue input 1 if so desired.

P08.06	AI1 inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	0				
Change mode	Run&Stop				

This parameter can be used to invert the analogue input1 reference (i.e. multiply the input scaling result by -1).

P08.07	AI1 filtering time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00s～10.00s				
Default	0.10s				
Change mode	Run&Stop				

The parameter can be used to adjust AI1 filtering time.

P08.08	AI2 function select				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: analogue input2 1: speed limit (Torque control) 2: Torque offset 3: No function 99: Advanced function				
Default	0				
Change mode	Stop Only				

Refer to the explanation of P08.03.

P08.09	AI2 offset				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−100.0%～+100.0%				
Default	0.0%				
Change mode	Run&Stop				

An offset can be added to each analogue input with a range from -100% to 100%. If the sum of the input and the offset exceeds ±100%, the result is limited to ±100%.

The parameter defines AI2 offset.

P08.10	AI2 scaling				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.000～20.000				
Default	1.000				
Change mode	Run&Stop				

This parameter is used to scale the analogue input 2 if so desired.

P08.11	AI2 inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

This parameter can be used to invert the analogue input 2 reference (i.e. multiply the input scaling result by -1).

P08.12	AI2 filtering time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00s～10.00s				
Default	0.10s				
Change mode	Run&Stop				

The parameter can be used to adjust AI2 filtering time.

P08.13	Analogue output function level control				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: P08.14 is only basic application (0～11) 1: P08.14 is advanced application (P00.00～P18.08)				
Default	0				
Change mode	Run&Stop				

HD700 analogue output terminals have basic and advanced applications function. The parameter is used to select the analogue output terminals are basic applications or advanced applications.

P08.13=0, the analogue output terminal is basic applications. P08.14 value range is 0 to 11. Refer to the explanation of P08.14.

P08.13=1, the analogue output terminal is advanced applications, P08.14 value range is P00.00 to P18.08.

P08.14	Analogue output function select				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: output frequency 1: reference frequency 2: active current 3: output current 4: motor speed 5: DC voltage 6: output voltage 7: AI1 level 8: AI2 level 9: length 10: counting 11: No function 99: Advanced function				
Default	0				
Change mode	Run&Stop				

The parameter is used to select analogue output function.

P08.13=0, the analogue output terminal is basic applications. P08.14 value range is 0 to 11.

P08.13=1, the analogue output terminal is advanced applications, P08.14 value range is P00.00 to P18.08.

It means that parameters from P00.00 to P18.08 can be selected as source parameter by P08.14. Actually, a basic application corresponds to a source parameter as shown in the table below:

Table 2-8-1 Corresponding parameter of analogue output function

P08.13＝0, P08.14＝	P08.13＝1, P08.14＝	Function	Corresponding output at 100% AI1
0	P05.11	Output frequency	Maximum frequency
1	P01.14	Reference frequency	Maximum frequency
2	P05.15	Torque current	Three times of the motor rated current
3	P05.14	Output current	Three times of the motor rated current
4	P05.08	Motor speed	Motor speed (rpm)
5	P05.13	DC bus voltage	220: 415V
			400: 830V
			690: 1125V
6	P05.12	Output voltage	Motor rated voltage
7	P08.17	AI1	10V
8	P08.18	AI2	10V
9	P14.11	Actual length	60000
10	P14.15	Set number	60000
11	—	No function	—

P08.15	Analogue output scaling				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.000～20.000				
Default	1.000				
Change mode	Run&Stop				

P08.16	Current loosing indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0: no loosing 1: loosing				
Change mode	Actual				

If P08.02 (P00.05) is set to 2 to 5, once the current input falls below 3mA, P08.16 (current loosing indicator) is set to 1.

P08.17	AI1 level				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0.0%～100.0%				
Change mode	Actual				

This parameter displays the level of the analogue signal present at analogue input 1.

In voltage mode, this is a unipolar voltage input where the input range is 0 to +10V.

In current mode, this is a unipolar current input having a maximum measurable input of 20mA. The drive can be programmed to convert the measured current to any one of the defined ranges in P08.02. The selected range is converted to 0 to 100.0%.

P08.18	AI2 level				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0.0%～100.0%				
Change mode	Actual				

This parameter displays the level of the analogue signal present at analogue input 2.

This is a unipolar voltage input having a range of 0 to +10V that is converted to 0 to 100%.

P08.19	Analogue output level				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0.0%～100.0%				
Change mode	Actual				

This parameter displays the level of the analogue output by percentage form.

For example:

When analogue output voltage is 5V, $P08.19=\frac{5V\times100\%}{10V}=50.0\%$

P08.20	AI1 upper limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～100.0%				
Default	0				
Change mode	Run&Stop				

The parameter is used to set the upper limit of AI1. If the actual analogue input is greater than the upper limit, then it is equal to the upper limit value.

P08.21	AI1 lower limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～P08.20				
Default	0				
Change mode	Run&Stop				

The parameter is used to set the lower limit of AI1. If the actual analogue input is less than the lower limit, then it is equal to the lower limit value.

P08.22	AI2 upper limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～100.0%				
Default	0				
Change mode	Run&Stop				

The parameter is used to set the upper limit of AI2. If the actual analogue input is greater than the upper limit, then it is equal to the upper limit value.

P08.23	AI2 lower limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～P08.20				
Default	0				
Change mode	Run&Stop				

The parameter is used to set the lower limit of AI2. If the actual analogue input is less than the lower limit, then it is equal to the lower limit value.

2.9 Menu P09: Digital input and output

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P09.01	Digital input function level control	0: P09.02 to P09.08 are basic applications (0～16) 1: P09.02 to P09.08 are advanced applications (P00.00～P18.08)	1	0	Run&Stop	0384H
P09.02	DI1 function	0: preset select bit 0 1: preset select bit 1 2: run 3: run forward (FWD) 4: run reverse (REV) 5: 3-wire enable 6: FWD/REV 7: Jog forward 8: UP 9: DOWN 10: enable 11: reset 12: control channel is switched to terminal 13: reset length counting 14: reset number counting 15: external trip 16: no function 99: advanced function	1	DI1: 3	Stop Only	0385H
P09.03	DI2 function			DI2: 4		0386H
P09.04	DI3 function			DI3: 7		0387H
P09.05	DI4 function			DI4: 0		0388H
P09.06	DI5 function			DI5: 1		0389H
P09.07	DI6 function			DI6: 10		038AH
P09.08	DI7 function			DI7: 11		038BH
P09.09	Status relays function level control	0: P09.10～P09.11 are basic applications (0～12) 1: P09.10～P09.11 are advanced applications (P00.00～P18.08)	1	0	Run&Stop	038CH

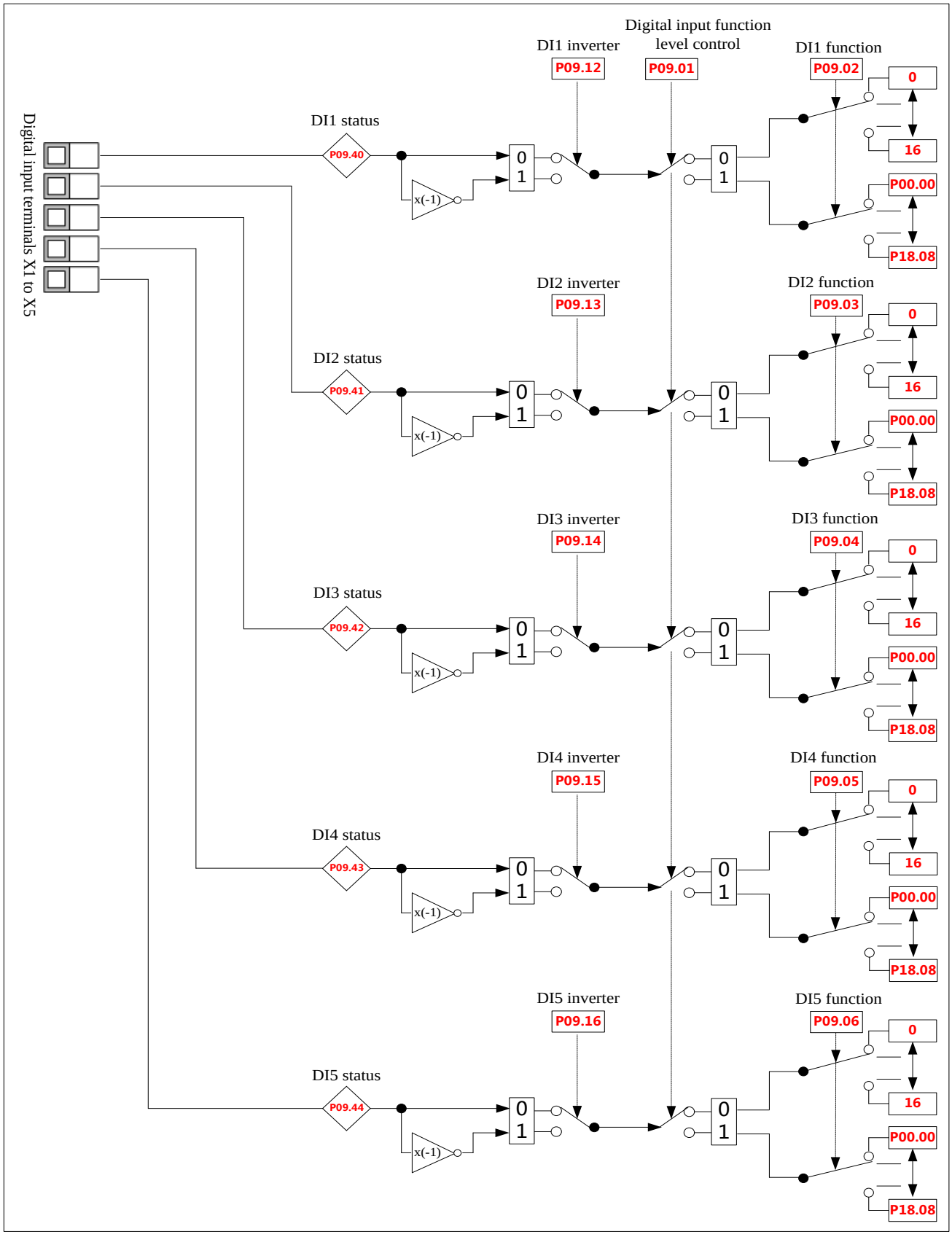
ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P09.10	Relay1 function	0: drive healthy 1: drive active 2: length arrival 3: external trip 4: under voltage trip 5: PLC finished 6:frequency reached 7: torque limit is working 8: time arrival 9: overload is calculating 10: at zero speed 11: brake logic is on 12: no function 99: advanced function	1	Relay1: 0	Run&Stop	038DH
P09.11	Relay2 function			Relay2: 1		038EH
P09.12	DI1 inverter	0: off 1: on	1	0	Run&Stop	038FH
P09.13	DI2 inverter	0: off 1: on	1	0	Run&Stop	0390H
P09.14	DI3 inverter	0: off 1: on	1	0	Run&Stop	0391H
P09.15	DI4 inverter	0: off 1: on	1	0	Run&Stop	0392H
P09.16	DI5 inverter	0: off 1: on	1	0	Run&Stop	0393H
P09.17	DI6 inverter	0: off 1: on	1	0	Run&Stop	0394H
P09.18	DI7 inverter	0: off 1: on	1	0	Run&Stop	0395H
P09.19	Relay1 inverter	0: off 1: on	1	0	Run&Stop	0396H
P09.20	Relay2 inverter	0: off 1: on	1	0	Run&Stop	0397H
P09.21	DI common select	0: 0V 1: 24V	1	0	Stop Only	0398H
P09.22	3-wire mode	0: disable 1: 3-wire 1 2: 3-wire 2	1	0	Stop Only	0399H
P09.23	DI6 mode	0: normal digit 1: length counting pulse 2: number counting pulse	1	0	Run&Stop	039AH

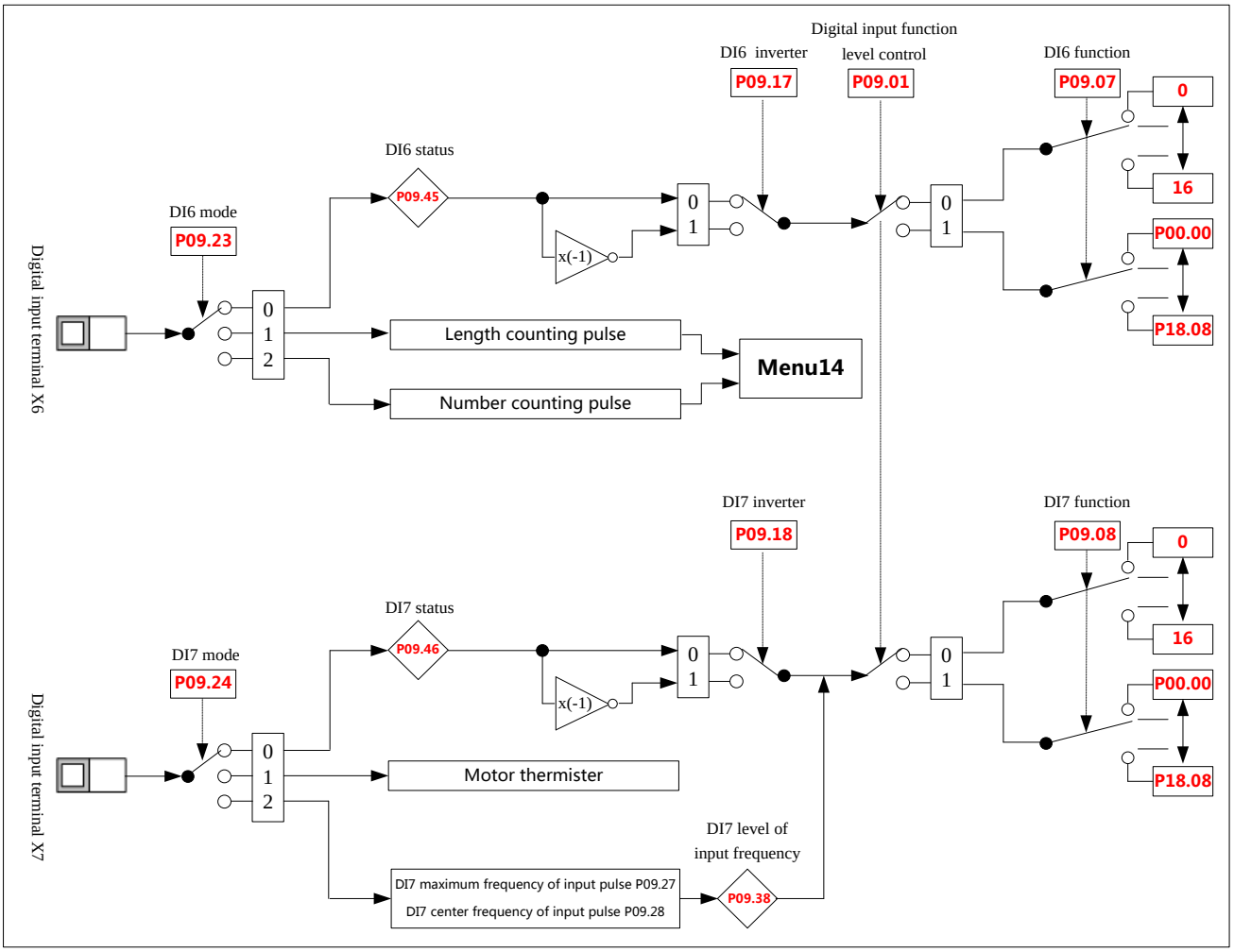
ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P09.24	DI7 mode	0: normal digit 1: motor thermistor 2: high frequency pulse	1	0	Run&Stop	039BH
P09.25	Reserved	–	–	–	–	–
P09.26	Reserved	–	–	–	–	–
P09.27	DI7 maximum frequency of input pulse	0.1kHz～50.0kHz	0.1kHz	10.0kHz	Run&Stop	039EH
P09.28	DI7 center of frequency of input pulse	0: no center 1: center = P09.27/2, frequency less than center is negative 2: center = P09.27/2, frequency less than center is positive	1	0	Run&Stop	039FH
P09.29	Digital output function level control	0: P09.30～P09.31 are basic applications (0～8) 1: P09.30～P09.31 are advanced applications (P00.00～P18.08)	1	0	Run&Stop	03A0H
P09.30	DO1 function	0: PLC is running recycle 1: drive is active 2: drive is alarming 3: 100% current 4: drive healthy 5: length counting arrival 6: running at zero speed 7: brake logic is on 8: no function 99: advanced function	1	DO1: 6	Run&Stop	03A1H
P09.31	DO2 function			DO2: 2		03A2H
P09.32	DO1 inverter	0: off 1: on	1	0	Run&Stop	03A3H
P09.33	DO2 inverter	0: off 1: on	1	0	Run&Stop	03A4H
P09.34	DO2 maximum frequency of output pulse	0.1kHz～50.0kHz	0.1kHz	10.0kHz	Run&Stop	03A5H
P09.35	DO2 output mode selection	0: Digital signal output 1: Pulse output 2: PWM output	1	0	Run&Stop	03A6H
P09.36	Reserved	–	–	–	–	–
P09.37	Reserved	–	–	–	–	–
P09.38	DI7 level of input frequency	−100.0%～+100.0%	0.1%	Actual	Actual	03A9H
P09.39	Reserved	–	–	–	–	–

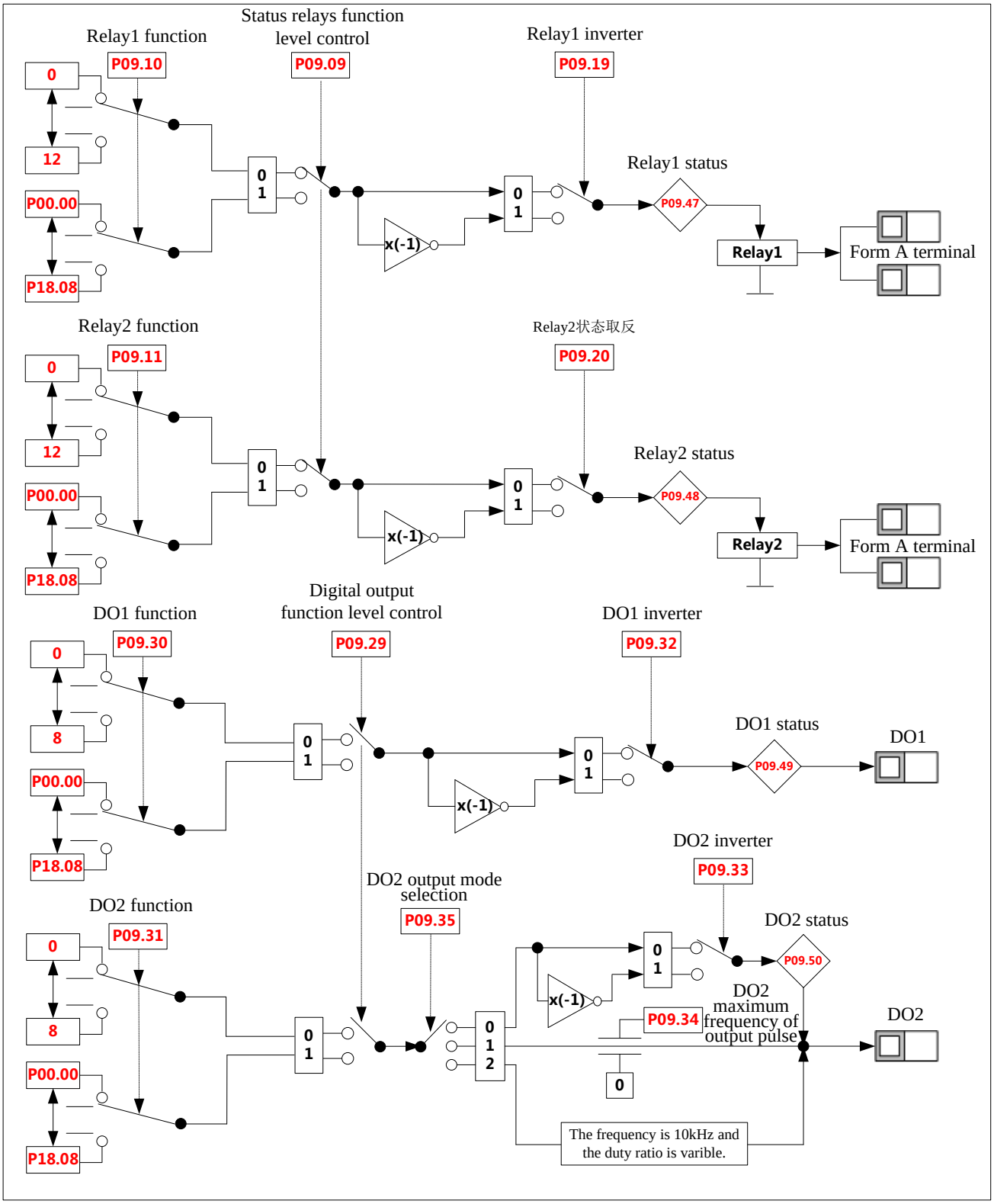
ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P09.40	DI1 status	0: off 1: on	1	Actual	Actual	03ABH
P09.41	DI2 status	0: off 1: on	1	Actual	Actual	03ACH
P09.42	DI3 status	0: off 1: on	1	Actual	Actual	03ADH
P09.43	DI4 status	0: off 1: on	1	Actual	Actual	03AEH
P09.44	DI5 status	0: off 1: on	1	Actual	Actual	03AFH
P09.45	DI6 status	0: off (P09.23≠0) 1: on	1	Actual	Actual	03B0H
P09.46	DI7 status	0: off (P09.24≠0) 1: on	1	Actual	Actual	03B1H
P09.47	Relay1 status	0: off 1: on	1	Actual	Actual	03B2H
P09.48	Relay2 status	0: off 1: on	1	Actual	Actual	03B3H
P09.49	DO1 status	0: output 0V 1: output 24V	1	Actual	Actual	03B4H
P09.50	DO2 status	0: output 0V 1: output 24V	1	Actual	Actual	03B5H

NOTE: For parameters P09.02 to P09.08, P09.10, P09.11, P09.30, P09.31, when the advanced function returns to basic function, if there is no corresponding options, will display “99”, and the advanced fuction will continue to take effect.

Menu 9 Logic diagram




Digital input function
DI6 inverter
level control
DI6 function
P09.17
P09.01
P09.07
0
16
P00.00
P18.08
DI6 status
P09.45
DI6 mode
P09.23
x(-1)
0
1
0
1
2
Digital input terminal X6
Length counting pulse
Number counting pulse
Menu14
DI7 inverter
DI7 function
P09.18
P09.08
DI7 status
P09.46
DI7 mode
P09.24
Digital input terminal X7
Motor thermister
DI7 level of
input frequency
DI7 maximum frequency of input pulse P09.27
DI7 center frequency of input pulse P09.28
P09.38


Relay1 function
Status relays function level control
Relay1 inverter
P09.10
P09.09
P09.19
0
12
P00.00
P18.08
0 1
x(-1)
Relay1 status
P09.47
Relay1
Form A terminal
Relay2 function
Relay2状态取反
P09.11
P09.20
Relay2 status
P09.48
Relay2
Form A terminal
DO1 function
Digital output function level control
DO1 inverter
P09.30
P09.29
P09.32
8
DO1 status
P09.49
DO1
DO2 inverter
P09.33
DO2 output mode selection
P09.35
DO2 function
DO2 status
P09.31
P09.50
0 1 2
P09.34
DO2 maximum frequency of output pulse
DO2
The frequency is 10kHz and the duty ratio is varible.

P09.01	Digital input function level control				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: P09.02 to P09.08 are basic applications (0～16) 1: P09.02 to P09.08 are advanced applications (P00.00～P18.08)				
Default	0				
Change mode	Run&Stop				

HD700 digital input terminals have basic and advanced applications. The parameter is used to select the digital input terminals are basic applications or advanced applications.

P09.01=0: digital input terminals (P09.02 to P09.08) are basic applications (0～16).

P09.01=1: digital input terminals (P09.02 to P09.08) are advanced applications (P00.00～P18.08).

P09.02	**DI1 function**				
P09.03	**DI2 function**				
P09.04	**DI3 function**				
P09.05	**DI4 function**				
P09.06	**DI5 function**				
P09.07	**DI6 function**				
P09.08	**DI7 function**				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	When P09.01 is set to 0: 0: preset select bit0 1: preset select bit 1 2: run 3: run forward (FWD) 4: run reverse (REV) 5: 3-wire enable 6: FWD/REV 7: Jog forward 8: UP 9: DOWN 10: enable 11: reset 12: control channel is switched to terminal 13: reset length counting 14: reset number counting 15: external trip 16: no function 99: advanced function				
Default	DI1: 3 (P03.22－run forward) DI2: 4 (P03.23－run reverse) DI3: 7 (P03.25－jog forward) DI4: 0 (P01.15－preset select bit0) DI5: 1 (P01.16－preset select bit1) DI6: 10 (P03.19－drive enable) DI7: 11 (P12.15－reset)				
Change mode	Stop Only				

P09.02 to P09.08 are DI1 to DI7 function selector parameters.

- When P09.01=0, the range of parameters (P09.02 to P09.08) is 0 to 16, P09.02 to P09.08 are basic applications:

  0: preset select bit 0

  1: preset select bit 1

  When a digital input terminal is 0 or 1, preset select bit 0 or 1, 4 preset speeds can be selected.

  For example:

  Define DI4 and DI5 as preset control terminals, set P09.05=0 (DI4 is preset select bit 0), P09.06=1 (DI5 is preset select bit 1). When P01.01 (P00.04)=2 (reference frequency source is preset), the drive will run at preset speed

(P04.01 to P04.04) after powering up according to DI4 and DI5 status.

Table 2-9-1A DI4, DI5 status and preset mapping table

DI5 status	DI4 status	Preset select
OFF	OFF	Preset 1 (P04.01)
OFF	ON	Preset 2 (P04.02)
ON	OFF	Preset 3 (P04.03)
ON	ON	Preset 4 (P04.04)

When P01.01 (P00.04) ≠2 (reference frequency source is not preset), the drive will run at preset speed in the following table after powering up according to DI4 and DI5 status.

Table 2-9-1B DI4, DI5 status and preset mapping table

DI5 Status	DI4 Status	Preset select
OFF	OFF	Keep the frequency setting
OFF	ON	Preset 2 (P04.02)
ON	OFF	Preset 3 (P04.03)
ON	ON	Preset 4 (P04.04)

2～7: Operation mode

In terminal control mode (P10.07 or P00.03 is set to 1), one function of 2 to 7 is selected by a DI terminal, it means that the terminal correspond with a parameter of P03.20 to P03.25. refer to the explanation of P03.20 to P03.25 for details.

8: output up, refer to P02.30

9: output down, refer to P02.31

10: drive enable, corresponding parameter is P03.19.

Refer to the explanation of P03.19.

11: reset, refer to P12.15

Set the terminal select this function, the terminal is trip reset terminal. When the drive is in the trip state, the terminal is connected with common port, the drive immediately from fault state reset for trouble-free state (fault conditions is eliminated and the trip code ＜F030).

12: control channel is switched to terminal, refer to P10.17.

Set the terminal select this function, then the control channel is switched to terminal control mode.

For example:

In keypad control mode (P10.07 or P00.03=0), set DI4=12, when DI4 is connected with common port, the drive control channel is switched to terminal control mode.

13: reset length counting, refer to the explanation of P14.18.

14: reset number counting, refer to P14.19.

15: external trip, corresponds with parameter P12.14. Refer to the explanation of P12.14.

16: no function

DI1 to DI7 default function is shown in the table below:

Table 2-9-2 DI1 to DI7 default function

Terminals	P09.01=0, function code	P09.01=1, parameter setting	Function
DI1	3	P03.22	Run forward
DI2	4	P03.23	Run reverse
DI3	7	P03.25	Jog forward

Terminals	P09.01=0, function code	P09.01=1, parameter setting	Function
DI4	0	P01.15	Preset select
DI5	1	P01.16	Preset select
DI6	10	P03.19	Drive enable
DI7	11	P12.15	Reset trip

NOTE:

Defaults of digital input terminals are limited by P09.22. The above content is only for the default of P09.22 (P09.22=0), used in 2-wire control mode. In 3-wire control mode, the default of P09.22 is different. Refer to the explanation of P09.22 for details.

- When P09.01=1, the value of P09.02 to P09.08 range is P00.00 to P18.08, it means all parameters are selected as destination parameters by using P09.02 to P09.08.

P09.09	Status relays function level control				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: P09.10～P09.11 are basic applications (0～12) 1: P09.10～P09.11 are advanced applications (P00.00～P18.08)				
Default	0				
Change mode	Run&Stop				

HD700 output relays have basic and advanced applications. The parameter is used to select output relays are basic applications or advanced applications.

P09.09=0: P09.10 to P09.11 are basic applications (0～12)

P09.09=1: P09.10 to P09.11 are advanced applications (P00.00～P18.08)

P09.10	Relay1 function				
P09.11	Relay2 function				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	When P09.09 is set to 0: 0: drive healthy 1: drive active 2: length arrival 3: external trip 4: under voltage trip 5: PLC finished 6: frequency reached 7: torque limit is working 8: time arrival 9: overload is calculating 10: at zero speed 11: brake logic is on 12: no function 99: advanced function				
Default	Relay1: 0 (P12.01－drive healthy) Relay2: 1 (P05.27－drive active)				
Change mode	Run&Stop				

The two parameters are output relays Relay1 and Relay2 function selector.

- When P09.09=0, the value of P09.10 to P09.11 is 0 to 12. If P09.19 and P09.20 is set to default:

  0: drive healthy, refer to P12.01

  No trips generated after power on, the relay acts.

  1: drive active, refer to P05.27

  When the drive is running, the relay acts.

  2: length arrival, refer to P14.13

  When length count value accumulates to the setting length value (P14.09), the relay acts. When the next length count pulse arrives, the relay is disconnected.

  3: External trip, refer to P12.14

  External fault alarm occurs, the relay acts.

  4: Under voltage trip, refer to P12.16

  When the DC bus voltage level below the under voltage limit, the relay acts.

  5: PLC finished, refer to P04.53

  When simple PLC single cycle finishes, the relay acts.

  6: frequency reached, refer to P01.23

  When output frequency is in band of frequency arrival, the relay acts.

  7: torque limit is working, refer to P07.24

  When torque reference is limited by torque limit, the relay acts.

  8: time arrival, refer to P10.16

  When set running time reaches, the relay acts.

  9: overload is calculating, refer to P12.17

When drive output current exceeds overload pre-alarm threshold (P12.05), and time longer than overload pre-alarm delay time (P12.06), the relay acts. Refer to the explanation of P12.05 and P12.06 for details.

10: at zero speed, refer to P01.24

When output frequency lower than P02.22, the relay acts.

11: the drive is in the state of braking, refer to P18.08

When brake condition arrives, the relay keeps closed.

12: no function

- When P09.09=1, the value of P09.10 to P09.11 is P00.00 to P18.08. It means all parameters are selected as source parameters, and the status of source parameters affect the relay status.

P09.12	**DI1 inverter**				
P09.13	**DI2 inverter**				
P09.14	**DI3 inverter**				
P09.15	**DI4 inverter**				
P09.16	**DI5 inverter**				
P09.17	**DI6 inverter**				
P09.18	**DI7 inverter**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

Setting these parameters to On (1) causes the input sense to the destination parameter to be inverted or the output sense from the source to be inverted. Refer to Menu 9 logic diagram.

P09.19	**Relay1 inverter**				
P09.20	**Relay2 inverter**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

Relay status is controlled by P09.10 to P09.11 selected source parameter:

Setting P09.19～P09.20 to 0 causes Relay1 and Relay2 sense to be not inverted.

Setting P09.19～P09.20 to 1 causes Relay1 and Relay2 sense to be inverted.

For example:

By default, P09.10=0, P09.19=0, no trips generated after power on, the relay closes. If set P09.19=1, no trips generated after power on, the relay opens.

P09.21	DI common select				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: 0V 1:24V				
Default	0				
Change mode	Stop Only				

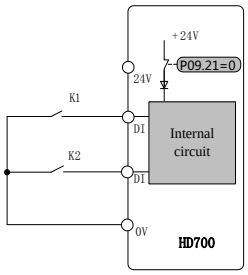
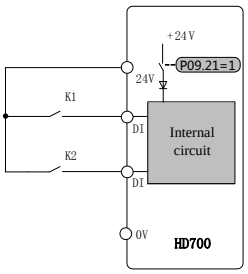
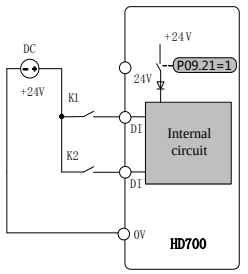
The parameter defines programmable digital input common terminal.

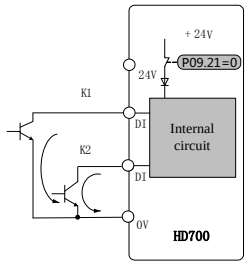
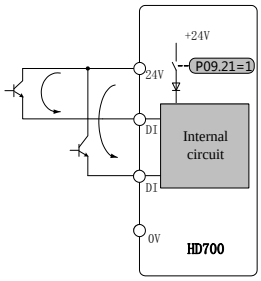
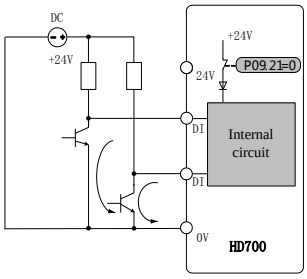
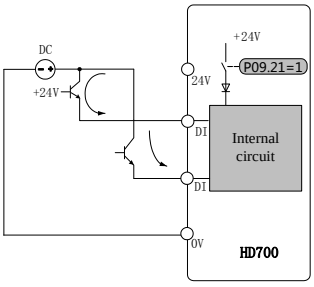
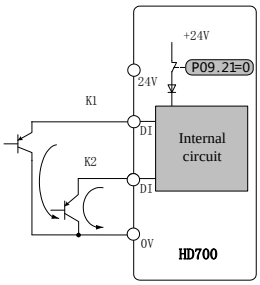
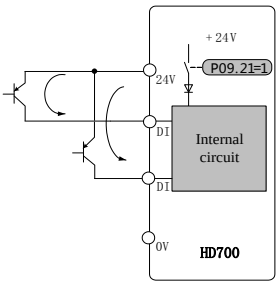
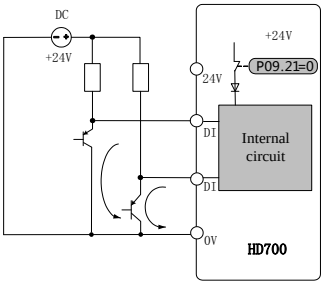
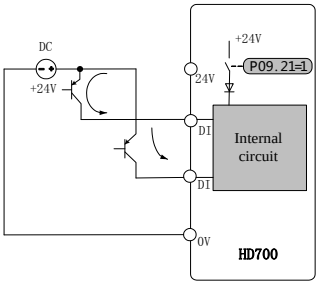
P09.21=0, common is 0V (source);

P09.21=1, common is 24V (sink).

Different types connection of DI and Common are shown in the table below:

Table 2-9-3 Digital input connection examples

P09.21 / Connection		P09.21=0 (Source)	P09.21=1 (Sink)
Switch type	By inner 24V		
	By outer supply	–	

Connection \ P09.21		P09.21=0 (Source)	P09.21=1 (Sink)
OC (NPN)	By inner 24V		
	By Outer supply		
OC (PNP)	By inner 24V		
	By Outer supply		

P09.22	3-wire mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: disable 1: 3-wire 1 2: 3-wire 2				
Default	0				
Change mode	Stop Only				

The parameter is used to select control modes of digital input terminals.

1) P09.22=0, 2-wire control mode is enabled, 3-wire mode is disabled.

   In this mode, terminal control is divided into two ways:

   - Terminals control the drive running forward or reverse by using P03.22 and P03.23.
     With the default setting of terminals as an example:
     P09.02=3 (P03.22), the drive is running forward.
     P09.03=4 (P03.23), the drive is running reverse.
   - Terminals control the drive running forward or reverse by using P03.20 and P03.24.
     When P03.22≠1 and P03.23≠1, DI4 is connected with common port, the drive is active. When DI5 is disconnected with common port, the drive is running forward. When DI5 is connected with common port, the drive is running reverse.

   In practical applications, not recommend that users use the two methods at the same time to control the drive running forward and reverse, lest cause confusion.

2) P09.22=1, 3-wire control mode 1

   3-wire control mode 1 is selected, DI1, DI2, DI3 are automatically set as below:

   P09.02=5, DI1 is 3-wire mode enabled, voltage control (SB1 is normal closed button, when it is open, the drive will stop.)

   P09.03=3, DI2 is Run Forward, latching control.

   P09.04=4, DI3 is Run Reverse, latching control.

   Wiring is as below:

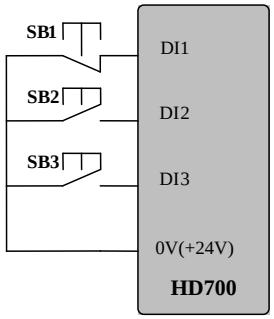


Figure 2-9-1 3-wire control mode 1 connection

SB1: stop button

SB2: run forward button

SB3: run reverse button

Press SB2, the drive is running forward and the order is latched;

Press SB3, the drive is running reverse and the order is latched;

Press SB1, the drive stops.

3) P09.22=2, 3-wire control mode 2

3-wire control mode 2 is selected, DI1, DI2, DI3 are automatically set as below:

P09.02=2, DI1 function is "RUN", latching control.

P09.03=5, DI2 function is 3-wire enabled, voltage control (SB2 is normal closed button, when it is open, the drive will stop.)

P09.04=6, DI3 function is FWD/REV, voltage control.

Wiring is as below:

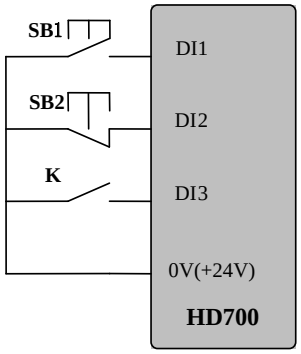


Figure 2-9-2 3-wire control mode 2 connection

SB1: Run button

SB2: Stop button

K: Direction switch

Press SB1, the drive is running, the order is latched.

K is open, the drive is running forward; K is closed, the drive is running reverse.

Press SB2, the drive stops.

Note: After press SB2, the drive stops, release the SB2 button, the drive keeps stop, have to trigger the SB1 again, and then drive will run.

P09.23	**DI6 mode**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: normal digit 1: length counting pulse 2: number counting pulse				
Default	0				
Change mode	Run&Stop				

Terminal DI6 is a normal programmable digital input terminal, it can also receive pulse input signal to realize length control and count control function.

Its input mode is selected by using P09.23:

- P09.23=0, DI6 is normal programmable digital input terminal.
- P09.23=1, DI6 is length counting pulse input terminal, pulse input frequency range is 0Hz to 60Hz. The drive's internal counter counts input pulse, and use P14.10 to P14.13, P14.18 for length control. Refer to related parameters of Menu P14 for details.
- P09.23=2, DI6 is number counting pulse input terminal, pulse input frequency range is 0Hz to 60Hz. The drive's internal counter counts input pulse, and use P14.14 to P14.17, P14.19 for count control. Refer to related parameters of Menu P14 for details.

NOTE: P09.23=1, length counting pulse input terminal is enabled, it has no effect on count control related parameters. Similarly, P09.23=2, number counting pulse input terminal is enabled, it has no effect on length control related parameters.

P09.24	**DI7 mode**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: normal digit 1: motor thermistor 2: high frequency pulse				
Default	0				
Change mode	Run&Stop				

Terminal DI7 is a normal programmable digital input terminal. In addition terminal DI7 can also be programmed as a motor thermistor input and high frequency pulse input (input frequency range is 1.0kHz to DI7 maximum frequency of input pulse (P09.27)).

Its input mode is selected by using P09.24:

- P09.24=0, DI7 is a programmable digital input terminal.
- P09.24=1, Motor thermal protection function is activated, terminal DI7 is programmed as a motor thermistor input terminal.

  Wiring is as below:

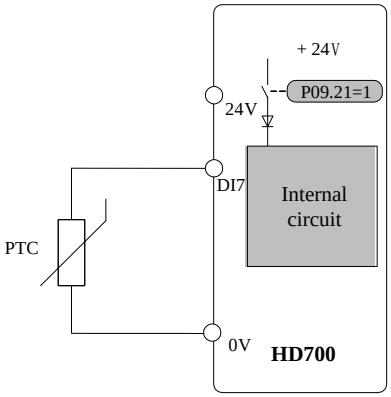


Figure 2-9-3 Motor thermistor input connection

When PTC thermistor resistance is 3kΩ, reaches motor thermal protection threshold, the drive will initiate a F011 trip. When thermistor resistance is 1.8kΩ, the trip can be reset. (Trip resistance: 3kΩ, Reset resistance: 1.8kΩ)

NOTE:

- This function is enabled when P09.21=1.
- The drive will not trip if the thermistor goes short circuit. The thermistor going short circuit will not damage the drive.

- P09.24=2, DI7 is a high frequency pulse input terminal. Refer to the explanation of P09.27, P09.28, P09.38 for details.

P09.25	**Reserved**				
P09.26	**Reserved**				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P09.27	**DI7 maximum frequency of input pulse**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.1kHz～50.0kHz				
Default	10.0kHz				
Change mode	Run&Stop				

The parameter defines DI7 maximum frequency of input pulse.

For example:

Set P09.27=10.0kHz, then DI7 maximum frequency of input pulse is 10.0kHz even if the actual DI7 frequency of input pulse exceeds 10.0kHz.

P09.28	**DI7 center frequency of input pulse**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: no center 1: center = P09.27/2, frequency less than center is negative 2: center = P09.27/2, frequency less than center is positive				
Default	0				
Change mode	Run&Stop				

The parameter defines DI7 centers frequency of input pulse.

P09.28=0, no center.

- DI7 level of pulse input frequency is positive. As shown in the figure below:

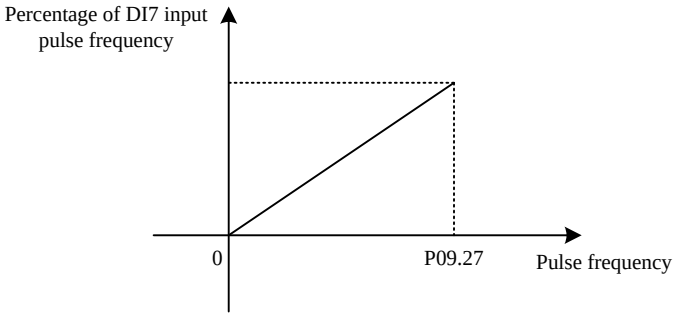


Figure 2-9-4 No center

- P09.28=1, center mode 1, as shown in the figure below:

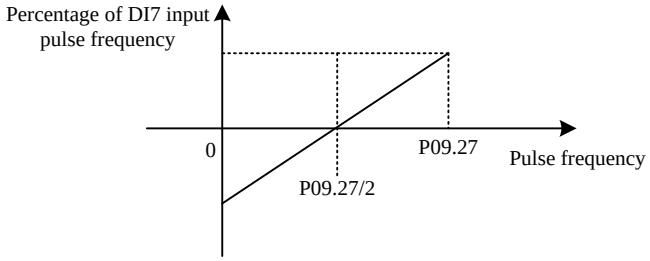


Figure 2-9-5 Center mode 1

Pulse input frequency has a center, center = P09.27/2, input frequency less than center is negative.

- P09.28=2, center mode 2

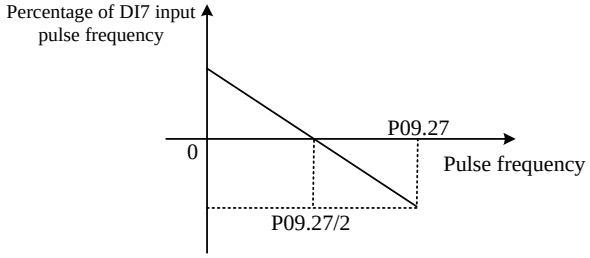


Figure 2-9-6 Center mode 2

Pulse input frequency has a center, center = P09.27/2, input frequency less than center is positive.

P09.29	**Digital output function level control**				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: P09.30～P09.31 are basic applications (0～8) 1: P09.30～P09.31 are advanced applications (P00.00～P18.08)				
Default	0				
Change mode	Run&Stop				

HD700 digital output terminals have basic and advanced applications. The parameter is used to select the digital input terminals are basic applications or advanced applications.

P09.29=0, DO1 and DO2 terminals are basic applications. P09.30 and P09.31 value range are from 0 to 8.

P09.29=1, DO1 and DO2 terminals are advanced applications. P09.30 and P09.31 value range is from P00.00 to P18.08.

P09.30	DO1 function				
P09.31	DO2 function				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	When P09.29 is set to 0: 0: PLC is running recycle 1: drive is active 2: drive is alarming 3: 100% current 4: drive healthy 5: length counting arrival 6: running at zero speed 7: brake logic is on 8: no function 99: advanced function				
Default	DO1: 6 (P01.24——the drive is running at zero speed) DO2: 2 (P12.20——the drive is alarming)				
Change mode	Run&Stop				

P09.30, P09.31 are DO1, DO2 function selector parameters.

When P09.29=0, function 0 to 8 are available for DO1, DO2.

When P09.29＝1, DO1 and DO2 have advanced applications. All parameters can be selected as source parameters by P09.30 and P09.31.

The corresponding relations between basic application function codes and advanced application function parameters are shown as below:

Table 2-9-4 The corresponding relations between DO basic applications function codes and advanced application parameters

P09.29＝0, P09.30 and P09.31 function code	P09.29＝1, parameters of P09.30 and P09.31 selected	Function
0	P04.54	PLC recycle running
1	P05.27	Drive active
2	P12.18	Drive alarm
3	P05.28	100% load
4	P12.01	Drive healthy
5	P14.13	Actual length meets the reference
6	P01.24	Zero speed
7	P18.08	Brake logic indicator
8	—	No function

P09.32	DO1 inverter				
P09.33	**DO2 inverter**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

Setting these parameters to On (1) causes the input sense to be inverted.

For example:

From default, P09.30=6 (the drive is running at zero speed), when the drive is running and output frequency reaches zero-speed, DO1 output is +24V. If set P09.32=1, then DO1 output is 0V.

P09.34	DO2 maximum frequency of output pulse				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.1kHz～50.0kHz				
Default	10.0kHz				
Change mode	Run&Stop				

The parameter defines DO2 maximum frequency of output pulse. Refer to the explanation for details.

P09.35	DO2 maximum frequency of output pulse				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: Digital signal output 1: Pulse output 2: PWM output				
Default	0				
Change mode	Run&Stop				

0: Digital signal output

DO2 can output two signals: 0V and 24 V.

1: DO2 is set as output pulse frequency function and the frequency range is 01.kHz to 50.0kHz (limited by P09.34). The output pulse frequency reflects the value of P05.11 (output frequency).

For example: as default, if P05.11 (output frequency) is 30Hz and DO2 output frequency is :

$$\frac{\text{P05.11}}{\text{P01.02 (maximum frequency)}} \times \text{P09.34 (DO2 maximum frequency of output pulse)} = \frac{30.00\text{Hz}}{50.00\text{Hz}} \times 10.0\text{kHz} = 6.0\text{kHz}$$

DO2 output is 6.0kHz pulse train.

2: DO2 is set as PWM output and frequency is 10.0kHz. the duty ratio reflects the value of P05.11 (output frequency).

For example: as default, if P05.11 (output frequency) is 30.00Hz and the duty ratio of DO2 output is:

$$\frac{\text{P05.11}}{\text{P01.02 (maximum frequency)}} \times 100\% = \frac{30.00\text{Hz}}{50.00\text{Hz}} \times 100\% = 60\%$$

DO2 output is a pulse train with 10.0kHz and 60% of the duty ratio.

The user can make the PWM output signal get through RC filter networks and then get DC output voltage. The DC output

voltage is proportional to the duty ratio of PWM. When DO2 output is 60% of the duty ratio, output DC voltage is 24V×60%＝14.4V.

NOTE: If P09.29＝0, P09.31＝0～7, the corresponding parameters are all digital quantity. At this point, if P09.35＝1, DO2 output is 0.1kHz or P09.34 setting value; if P09.35＝2, DO2 output is 0V or 24V.

P09.36	**Reserved**				
P09.37	**Reserved**				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P09.38	**DI7 level of input frequency**				
Coding	RW	US	PT	ND	PS
				■	
Range	−100.0%～+100.0%				
Change mode	Actual				

- When P09.24=2 (terminal DI7 is programmed as a high frequency pulse input terminal), the parameter displays percentage of DI7 input frequency:

  When P09.28=0 (DI7 input pulse has no center):

$$\text{P09.38}=\frac{\text{DI7 input frequency}}{\text{P09.27 (DI7 maximum frequency of input pulse)}}\times 100\%$$

  When P09.28=1 (DI7 input pulse center mode1):

$$\text{P09.38}=\left(\frac{\text{DI7 input frequency}}{\text{P09.27 (DI7 maximum frequency of input pulse)/2}}-1\right)\times 100\%$$

  When P09.28=2 (DI7 input pulse center mode2):

$$\text{P09.38}=\left(\frac{\text{DI7 input frequency}}{\text{P09.27 (DI7 maximum frequency of input pulse)/2}}\right)\times 100\%$$

  Refer to the explanation of P01.01 for details.

- When P09.24≠2, the parameter displays 0.0

P09.39	**Reserved**				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P09.40	DI1 status				
P09.41	DI2 status				
P09.42	DI3 status				
P09.43	DI4 status				
P09.44	DI5 status				
P09.45	DI6 status				
P09.46	DI7 status				
Coding	RW	US	PT	ND	PS
			■	■	
Range	DI1～DI5: 0: off 1: on DI6: 0: off (P09.23≠0) 1: on DI7: 0: off (P09.24≠0) 1: on				
Change mode	Actual				

Display digital input terminals DI1 to DI7 status. When terminal is disconnected with common port, displays 0. When terminal is connected with common port, displays 1.

NOTE:

- When P09.23≠0 (DI6 input mode selects input pulse), P09.45 displays 0.
- When P09.24≠0 (DI7 input mode selects motor thermistor input or high frequency pulse), P09.46 displays 0.

P09.47	Relay1 status				
P09.48	Relay2 status				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0: off 1: on				
Change mode	Actual				

Display Relay1 and Relay2 status.

0: the relay contact is disconnected.

1: the relay contact is connected.

P09.49	DO1 status				
P09.50	DO2 status				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0: output 0V 1: output 24V				
Change mode	Actual				

Display digital output terminals DO1, DO2 status.

0: output 0V

1: output 24V

NOTE: When P09.31=8 or P09.31=9 (DO2 function is output frequency or PWM output), P09.50 displays 0.

2.10 Menu P10: Communication and general function

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P10.01	Communication protocol	0: Modbus 1: reserved	1	0	Run&Stop	03E8H
P10.02	Address	0～247	1	1	Run&Stop	03E9H
P10.03	Baud rate	0: 2.4KBPS 1: 4.8KBPS 2: 9.6KBPS 3: 19.2KBPS 4: 38.4KBPS 5: 57.6KBPS	1	3	Run&Stop	03EAH
P10.04	Comms. configuration	0: 1-8-1, RTU, without checking 1: 1-8-2, RTU, without checking 2: 1-8-1, RTU, with odd bit checking 3: 1-8-1, RTU, with even bit checking	1	1	Run&Stop	03EBH
P10.05	Response delay time	0ms～250ms	1ms	2ms	Run&Stop	03ECH
P10.06	User Code	0～9999	1	0	Run&Stop	03EDH
P10.07	Control mode	0: Keypad 1: Control terminal 2: Serial communication	1	0	Stop Only	03EEH
P10.08	Load defaults	0: off 1: load default	1	0	Stop Only	03EFH
P10.09	Fan control	0: under control 1: forced running	1	0	Run&Stop	03F0H
P10.10	Switching frequency	1kHz～15kHz	1kHz	By model	Run&Stop	03F1H
P10.11	Switching frequency automatic adjustment	0: off 1: on	1	1	Run&Stop	03F2H
P10.12	Low DC bus operation (only for 400V models)	0: off 1: on	1	0	Stop Only	03F3H
P10.13	Model code	0～255	1	By model	Actual	03F4H
P10.14	Drive status	0～65535	1	Actual	Actual	03F5H
P10.15	Set running time	0～P10.25	1	0	Run&Stop	03F6H
P10.16	Set time is meet	0: no 1: meet	1	Actual	Actual	03F7H
P10.17	Control channel is switched to terminal	0: no action 1: control channel is terminal	1	Actual	Actual	03F8H
P10.18	Keypad is disconnected with drive	0: carry on running 1: stop Note: Keypad control mode.	1	1	Stop Only	03F9H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P10.19	Load default after remove User Code by hardware	0: no 1: load default	1	0	Run&Stop	03FAH
P10.20	Forced dc brake	0～1	1	Actual	Actual	03FBH
P10.21	PID output keep	0～1	1	Actual	Actual	03FCH
P10.22	Power off stop mode	0: Coasting 1: Ramp stop	1	0	Stop Only	03FDH
P10.23	Cumulative running time reset	0: Off 1: On	1	0	Run&Stop	03FEH
P10.24	Set the unit of running time	0: Hour 1: Second	1	0	Stop Only	03FFH
P10.25	Set running time upper limit	0～60000	1	1000	Stop Only	0400H

P10.01	Communication protocol				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0～1				
Default	0				
Change mode	Run&Stop				

Communications protocol selection.

0: the Modbus protocol

1: reserved

P10.02	Address				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～247				
Default	1				
Change mode	Run&Stop				

This parameter is used to define the unique address for the drive for the serial interface. The drive is always a slave. Address 0 is used to globally address all slaves, and so this address should not be set in this parameter.

The communications port on the HD700 drive will support Modbus RTU protocol only. Drive parameter access with basic Modbus RTU.

P10.03	Baud rate				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: 2.4KBPS 1: 4.8KBPS 2: 9.6KBPS 3: 19.2KBPS 4: 38.4KBPS 5: 57.6KBPS				
Default	3				
Change mode	Run&Stop				

This parameter is used to select the comms port baud rate in kilo baud. The unit is KBPS. Serial comms. baud rate indicates communications speed. It means the number of bit transferred every second.

P10.04	Communication configuration				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～3				
Default	1				
Change mode	Run&Stop				

The parameter is used to set up communications data format.

0: 1-8-1, RTU, without checking

1: 1-8-2, RTU, without checking

2: 1-8-1, RTU, with odd bit checking

3: 1-8-1, RTU, with even bit checking

P10.05	Response delay time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0ms～250ms				
Default	2ms				
Change mode	Run&Stop				

Modbus RTU uses a silent period detection system to detect the end of a message. This silent period is normally the length of time for 3.5 characters at the present baud rate, but for systems that cannot turn the communications buffers around fast enough this time can be extended to the time programmed in P10.05.

P10.06	User code (P00.01)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0～9999				
Default	0				
Change mode	Stop Only				

- Set the user code

  Default value of P10.06 is "0" and user code function is disabled. If set P10.06 a non "0" value (1～9999) and press PRG once and press ESC twice, it will enable the user code function. The example of setting the user code to 4 showed as below figure:

Figure 2-10-1 User code setting flow

- Verify the user code (PIN)

  When the user code is enabled, only after entering the correct PIN into P10.06 and press PRG, the customer can view and edit all the parameters. After verifying user code successfully, if there is no any action on any switch on the keypad in two minites, the value of P10.06 will be changed to "0" automatically, the user code function is enabled again, and the keypad will show the normal display (selected by P05.01).

If the PIN is "8" and the user code function is enabled, the following figure shows how to pass the PIN verifying.

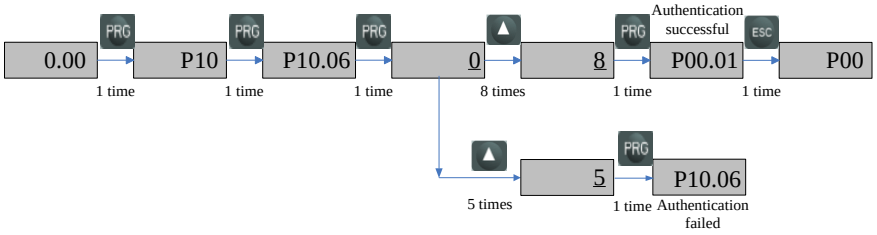


Figure 2-10-2 PIN verifying procedure

- Remove the user code

  There are two methods to remove the user code:

  - Software remove

    After verifying the PIN successfully, change the content of P10.06 to "0" and then press PRG, disable the user code function.

  - Hardware remove

    During the drive power off process, press the switches of PRG + STOP + ▼ at the same time and then loosen the switches after power up. Change the content of P10.06 to "0" and disable the user code function.

NOTE: When the user code is enabled, RS485 serial communications is enabled and PCTools (HDSoft) is disabled.

P10.07	**Control mode (P00.03)**				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0～2				
Default	0				
Change mode	Stop Only				

0: Keypad

1: Control terminal

2: Serial communications

P10.08	**Load defaults (P00.24)**				
Coding	RW	US	PT	ND	PS
	■				
Range	0: off 1: load default				
Default	0				
Change mode	Stop Only				

If this parameter is set to 1 and press “PRG” key when the drive is inactive, the parameters of attribute US=1 except motor stator resistance (P13.11 or P13.23) have been set to default value. After the parameters have been set to default values they are automatically saved to the drive’s internal EEPROM.

NOTE: Load defaults are enabled when the drive is in the fault state.

P10.09	Fan control				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: under control 1: forced running				
Default	0				
Change mode	Run&Stop				

The parameter defines the running conditions of the drive fan.

When this parameter is set to 0, the fan is controlled by the drive according to the drive internal temperatures.

When this parameter is set to 1, the fan runs at full speed at all times when the drive is powered up.

P10.10	Switching frequency (P00.21)				
Coding	RW	US	PT	ND	PS
	■	■			
Range	1kHz～15kHz				
Default	By model				
Change mode	Run&Stop				

This parameter defines the required PWM switching frequency. The changes of switching frequency will affect motor's noise and loss. As shown in the table below:

Table 2-10-1 Influence on changes of switching frequency to motor and drive

Switching frequency	low→high
Motor noise	high→low
Output current waveform	bad→good
Temperature rise	high→low
Drive temperature rise	low→high
Leakage current	low→high
Radiated interference	small→large

P10.11	Switching frequency automatic adjustment				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	1				
Change mode	Run&Stop				

0: off Switching frequency automatic adjustment disabled

1: on Switching frequency automatic adjustment enabled

When the parameter is set to 0, switching frequency automatic adjustment is disabled. If the feature is disabled the drive will trip immediately on F009 (IGBT junction temperature overheat) when the IGBT temperature gets too high.

When the parameter is set to 1, the drive thermal protection scheme will adjust the switching frequency automatically according to IGBT temperature when necessary to prevent the drive from overheating.

NOTE: The range of switching frequency automatic adjustment is limited by the setting value of P10.10 (P00.21).

P10.12	Low DC bus operation (only for 400V models)				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Stop Only				

The parameter is only applied to 400V models.

0: OFF Low DC bus operation disabled

1: On Low DC bus operation enabled

The Low DC bus operation is designed to enable 3 phase 400VAC (medium voltage) HD700 drives to be run off a single phase 200VAC (low voltage) supply in the event of a primary 400VAC supply failure.

When the primary supply fails, the backup supply can be switched in. This will allow the drive to control the motor at a reduced power, for example to move an elevator up or down to the next floor.

NOTE:

- There is no de-rating as such when low DC bus operation is enabled however the power will be limited by the reduced voltage and ripple generated on the DC bus of the drive.
- When P12.13 is enabled and the DC bus voltage is less than 330VDC, the keypad will display alarm code H005 to indicate that it is supplied from a low voltage back up supply.
- Low DC bus operation voltage levels (P10.12=1):
  230VDC < DC bus voltage < 330VDC→alarm H005
  DC bus voltage < 230VDC→initiate a F003 trip

P10.13	Model code				
Coding	RW	US	PT	ND	PS
Range	0～255				
Change mode	Actual				

The parameter corresponds with drive models. If the model code does not correspond with the drive model, the drive will initiate a F038 trip. Model codes for different models are shown in the table below:

Table 2-10-2 Model codes

Model name	Model code	Size
HD700-20D00040	0	A
HD700-20D00075	1	A
HD700-20D00150	2	A
HD700-20D00220	3	B
HD700-20T00400	8	C
HD700-40T00075	4	A
HD700-40T00150	5	A
HD700-40T00220E	66	A
HD700-40T00220	6	B
HD700-40T00400	7	B

Model name	Model code	Size
HD700-40T00550P	64	B
HD700-40T00550E	65	B
HD700-40T00550	9	C
HD700-40T00750	10	C
HD700-40T01100P	72	C
HD700-40T01100	16	D
HD700-40T01500	17	D
HD700-40T01850	18	E
HD700-40T02200	19	E
HD700-40T03000E	67	E1
HD700-40T03700E	68	E1
HD700-40T03000	20	F
HD700-40T03700	21	F
HD700-40T04500	22	F
HD700-40T05500	23	F
HD700-40T07500	24	F
HD700-40T09000	25	G
HD700-40T11000	26	G
HD700-40T13200	27	G
HD700-40T16000	28	J
HD700-40T18500	56	J
HD700-40T20000	29	J
HD700-40T16000	28	K
HD700-40T18500	56	K
HD700-40T20000	29	K
HD700-40T25000	30	K
HD700-40T28000	58	K
HD700-40T31500	31	L
HD700-40T35500	32	L
HD700-40T40000	33	L
HD700-40T45000	34	L
HD700-60T03000	35	F
HD700-60T03700	36	F
HD700-60T04500	37	F
HD700-60T05500	38	F
HD700-60T07500	39	F
HD700-60T09000	40	G
HD700-60T11000	41	G
HD700-60T13200	42	G
HD700-60T16000E	43	J
HD700-60T18500E	57	J

Model name	Model code	Size
HD700-60T20000E	44	J
HD700-60T16000	43	K
HD700-60T18500	57	K
HD700-60T20000	44	K
HD700-60T25000	45	K
HD700-60T28000	59	K
HD700-60T31500	46	L
HD700-60T35500	47	L
HD700-60T40000	48	L
HD700-60T45000	49	L

P10.14	Drive status				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0～65535				
Change mode	Actual				

The parameter is used to display the drive status. the value of the parameter means as the table below:

Table 2-10-3 Drive status words

Bit	Function	Related parameters
0	Drive healthy	P12.01
1	Drive active	P05.27
2	Rated load is on	P05.28
3	Frequency arrival indicator	P01.23
4	At zero speed	P01.24
5	Reverse running indicator	P03.30
6	Torque being limited indicator	P07.24
7	Set time is meet	P10.16
8	Control channel is switched to terminal	P10.17
9	Under voltage indicator	P12.16
10	Overload accumulator on indicator	P12.17
11	Alarm indicator	P12.18
12	Actual number meets reference number	P14.16
13	Actual number meets set number	P14.17
14	PLC finished indicator	P04.53
15	PLC recycle mode indicator	P04.54

NOTE: The value of this parameter is a 16-bit binary number, and it is displayed on the keypad in a decimal number.

For example:

P10.14=3, the binary code is 0000000000000011, means that the drive is healthy and in the accelerated running process.

P10.15	Set running time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～P10.25				
Default	0				
Change mode	Run&Stop				

If P10.24=0, the unit of set running time is hour; if P10.24=1, the unit of set running time is second.

NOTE: If set P10.15 to 0, the accumulative running time function is disabled. P10.16 will keep 0 and reset the accumulative running time.

P10.16	Set time is meet				
Coding	RW	US	PT	ND	PS
Range	0: no 1: meet				
Change mode	Actual				

P10.15 is used to set the drive running time.

P10.16 is used to indicate the running time.

When the drive running time exceeds the setting time, P10.16=1.

NOTE:

When P10.15=0, P10.16=0:

- If P10.15＝0, P10.16 is always zero. Even if the drive is active, P10.16 is still zero.
- Calculate the drive running time starting from the drive receiving the running signal and finishing when the drive stops. Restart calculating the drive running time at the next operation. For example, set P10.15=2, the drive stops after the first running an hour. It will take two hours at the next operation until P10.16 is set to 1.
- If change the set operation time (P10.15) when the drive is active, the timer judges whether time arrives according to time calculated.

  For example:

  If set P10.15=2, set P10.15=3 after running one and a half hours, then it will be running one and a half hours until P10.16 is set to 1.

  If set P10.15=1, P10.16=1 after running an hour. At this time set P10.15=2 when the drive is active, then P10.16 is set to zero immediately. It will be running one hour until P10.16 is set to 1.

P10.17	Control channel is switched to terminal				
Coding	RW	US	PT	ND	PS
				■	
Range	0～1				
Change mode	Actual				

The parameter is used to control the channel is switched to terminal.

Define a digital input terminal to this parameter to realize "control channel is switched to terminal" function.

When P10.17=1, the function is enabled, and the operation mode is switched to terminal mode. When P10.17=0, the function is disabled, and the operation mode returns to the original mode.

For example:

In keypad control mode (P10.07=0 or P00.03=0), set P09.02=12 or P09.02=P10.17, than DI1 is 1 and the control mode is switched to terminal control mode.

P10.18	Keypad is disconnected with drive				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: carry on running 1: stop Note: Keypad control mode.				
Default	1				
Change mode	Stop Only				

The parameter is used to control if the keypad is disconnected with drive in keypad control mode, the drive stops or not.

NOTE: The parameter is enabled in keypad control mode.

P10.19	Load default after remove user code by hardware				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: no 1: load default				
Default	0				
Change mode	Run&Stop				

The parameter is used to whether the drive loads default after removing user code by hardware when the drive is locked by a password. If the parameter is set to 1, the function is the same when P10.08=1.

P10.20	Forced DC brake				
Coding	RW	US	PT	ND	PS
				■	
Range	0: off 1: on				
Change mode	Actual				

The parameter is used to make the motor immediately go into the DC injection braking mode by force. DC injection braking current can be set by P03.13 (stop DC injection braking current). The user can define DI terminals as this function or use the function by setting advanced programmable module.

P10.21	PID output keep				
Coding	RW	US	PT	ND	PS
				■	
Range	0: off 1: on				
Change mode	Actual				

The parameter is used to keep PID output. When P10.21 is set to 1, PID output will not change, namely P15.22 remains unchanged. The user can define DI terminals as this function or use the function by setting advanced programmable module.

P10.22	Power off stop mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: Coasting 1: Ramp stop				
Default	0				
Change mode	Stop Only				

The parameter is used to set the stop mode when the DC bus voltage is too low.

0: Coasting

If the DC bus voltage is below V_{uu}, the drive will initiate a F003 trip and block IGBT.

If the DC bus voltage is over V_{uuRst}, then reset F003 trip.

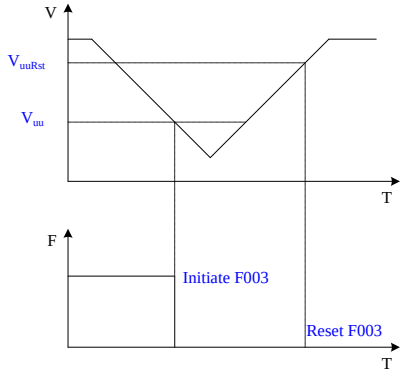


Figure 2-10-3 Power off stop mode-coasting

1: Ramp stop

If the DC bus voltage is below V_{ml}, the drive will decelerate according to deceleration rate 2 (P02.07). When the running frequency is zero, block IGBT.

If the DC bus voltage falls to V_{uu}, the drive will initiate a F003 trip, as shown in the following figure a.

If the DC bus voltage is over V_{uuRst}, the drive will accelerate to the reference frequency according to the setting acceleration rate, as shown in the following figure b.

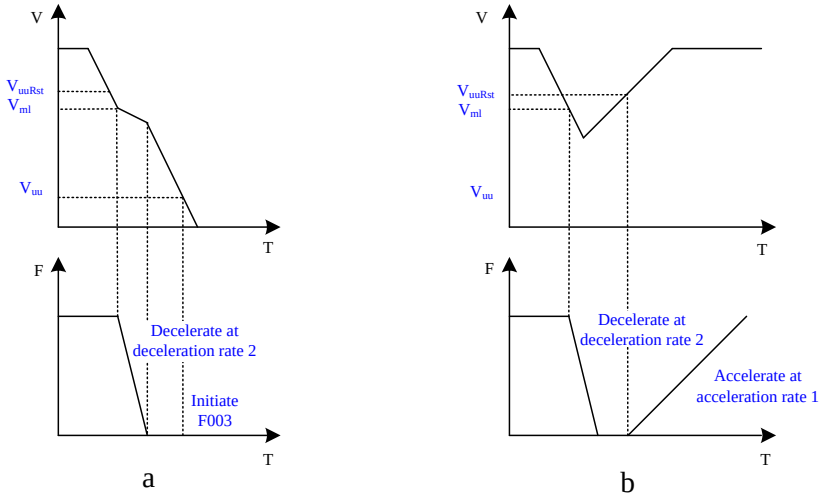


Figure 2-10-4 Power off stop mode-ramp stop

For different models, the voltage values as shown in the following table:

Voltage classes / Voltage value	200V	400V	690V
V_{uu}	175	330	435
V_{ml}	205	410	540
V_{uuRst}	215	425	590

P10.23	Cumulative running time reset				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	0				
Change mode	Run&Stop				

When P10.23=1, reset P10.16 and restart accumulating running time.

P10.24	The unit of set running time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: h 1: s				
Default	0				
Change mode	Stop Only				

The parameter is used to set the unit of set running time.

For example:

Set P10.15=1000, if set P10.24=0, it means that the set running time is 1000 hours. When the drive accumulative running time arrives 1000 hours, P10.16 is 1. If set P10.24=1, it means that the set running time is 1000 seconds. When the drive accumulative running time arrives 1000 seconds, P10.16 is 1.

P10.25	Set running time upper limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～60000				
Default	1000				
Change mode	Stop Only				

The parameter is used to set the upper limit of P10.15 (set running time).

2.11 Menu P11: Fault tracking

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P11.01	Trip 1	0～99	1	0	Actual	044CH
P11.02	Trip 2					044DH
P11.03	Trip 3					044EH
P11.04	Trip 4					044FH
P11.05	Trip 5					0450H
P11.06	Trip 6					0451H
P11.07	Trip 7					0452H
P11.08	Trip 8					0453H
P11.09	Trip 9					0454H
P11.10	Last trip					0455H
P11.11	Last trip frequency	−P01.02～+P01.02	0.01Hz	Actual	Actual	0456H
P11.12	Last trip current	0.0A～3×motor rated current	0.1A	Actual	Actual	0457H
P11.13	Last trip DC bus voltage	200V: 0～415V 400V: 0～830V 690V: 0～1150V	1V	Actual	Actual	0458H
P11.14	Last trip digital input terminals status	0～255	1	Actual	Actual	0459H
P11.15	Last trip digital output terminals status	0～255	1	Actual	Actual	045AH
P11.16	Present failure logging	0～99	1	0	Actual	045BH

P11.01	Trip 1				
P11.02	Trip 2				
P11.03	Trip 3				
P11.04	Trip 4				
P11.05	Trip 5				
P11.06	Trip 6				
P11.07	Trip 7				
P11.08	Trip 8				
P11.09	Trip 9				
P11.10	Last trip				
Coding	RW	US	PT	ND	PS
			■	■	■
Range	0～99				
Change mode	Actual				

Contain the last 10 drive trips. P11.10 is the most recent trip and P11.01 the oldest. When a new trip occurs, all parameters move down one, the current trip is put in P11.10 and the oldest trip is lost off the bottom of the log.

The trip string is "Fxxx", where "xxx" is the trip number. For example, overcurrent trip, displays F001. The value of P11.01 to P11.10 indicates the trip number. For example, the most recent trip is F001, and then the value of P11.10 is 1.

The drive provides protection design. The protection function is active once the trip occurs, the drive stops output. The relay1 is active (relay1=0), the keypad displays the trip code.

About possible trips for HD700 drives and the treatment, please refer to ***HD700 user manual*** chapter five.

The trip F003 is not stored unless the drive is running when the trip occurs. (Because the trip F003 occurs at power off.)

P11.11	Last trip frequency				
Coding	RW	US	PT	ND	PS
				■	■
Range	−P01.02～+P01.02				
Change mode	Actual				

The parameter is used to indicate the running frequency at the last trip.

P11.12	Last trip current				
Coding	RW	US	PT	ND	PS
				■	
Range	0.0A～3×motor rated current				
Change mode	Actual				

The parameter is used to indicate the running current at the last trip.

P11.13	Last trip DC bus voltage				
Coding	RW	US	PT	ND	PS
				■	
Range	200V: 0～415V 400V: 0～830V 690V: 0～1150V				
Change mode	Actual				

The parameter is used to indicate DC bus voltage at the last trip.

P11.14	Last trip digital input terminals status				
Coding	RW	US	PT	ND	PS
				■	
Range	0～255				
Change mode	Actual				

Indication of DI terminal level at the last trip. P11.14 is a decimal number, which displays all DI terminal level at the last trip. It is transferred from a 7 digits binary number. BIT0 to BIT6 are separately linked to DI1 to DI7 level, when the linked DI terminal is high, the BIT is 1, otherwise it is 0. As shown in the following table:

Table 2-11-1 Bit of digital input terminals linked at the last trip

Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
DI7	DI6	DI5	DI4	DI3	DI2	DI1

Assumed that: Both DI3 and DI5 terminal level is 1 in a trip, while other DI terminal level is 0. The corresponding binary value of P11.14 is 0010100, it is decimal value is 20. As a result, the display value of P11.14 is 20.

P11.15	Last trip digital output terminals status				
Coding	RW	US	PT	ND	PS
				■	
Range	0～255				
Change mode	Actual				

Indication of DO terminal level at the last trip. P11.15 is a decimal number, which displays all DO terminal level at the last trip. It is transferred from a 4 digits binary number. BIT0 to BIT3 are separately linked to DI1, DO2, Relay1, Relay2, when the linked DO terminal is high, the BIT is 1, otherwise it is 0. As shown in the following table:

Table 2-11-2 bit of digital output terminals linked at last trip

Bit3	Bit2	Bit1	Bit0
DO2	DO1	RLY2	RLY1

Assumed that: DO2 is 1, DO1 is 0, relay1 is on, and relay2 is off in a trip. The corresponding binary value of P11.15 is 1001, it is decimal value is 9. As a result, the display value of P11.15 is 9.

P11.16	Present failure logging				
Coding	RW	US	PT	ND	PS
			■	■	■
Range	0～99				
Change mode	Actual				

The parameter is used to record the drive present fault code. If the fault is eliminated and reset the fault, then reset the parameter and it is not saved when power off.

2.12 Menu P12: Protecting

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P12.01	Drive healthy	0: off 1: on	1	Actual	Actual	04B0H
P12.02	Ramp hold by high voltage threshold	0: off 1: on	1	1	Stop Only	04B1H
P12.03	High voltage threshold	220V: 350V～370V 400V: 750V～780V 690V: 1000V～1125V	1	220V: 370V 400V: 780V 690V: 1125V	Stop Only	04B2H
P12.04	Overload pre-alarm	0: off 1: on	1	1	Stop Only	04B3H
P12.05	Overload pre-alarm threshold	80.0％～150.0％	0.1%	130.0%	Run&Stop	04B4H
P12.06	Overload pre-alarm delay time	0.0s～60.0s	0.1s	5.0s	Run&Stop	04B5H
P12.07	Auto reset	0: no auto reset 1～100: times can auto reset	1	0	Stop Only	04B6H
P12.08	Auto reset delay	2.0s～20.0s	0.1s	5.0	Stop Only	04B7H
P12.09	Input phase loss delay time	0.0s～3000.0s	0.1s	0.1s	Stop Only	04B8H
P12.10	Output phase loosing	0: off 1: on	1	0	Stop Only	04B9H
P12.11	Motor overload protection mode	0: normal motor 1: variable frequency motor	1	1	Stop Only	04BAH
P12.12	Motor overload protection factor	0～(drive rated current/motor rated current)×100%	1	100%	Run&Stop	04BBH
P12.13	Alarm display control	0: not display 1: display	1	1	Run&Stop	04BCH
P12.14	External fault	0: off 1: on	1	0	Run&Stop	04BDH
P12.15	Reset trip	0: off 1: on	1	0	Stop Only	04BEH
P12.16	Under voltage indicator	0: off 1: on	1	Actual	Actual	04BFH
P12.17	Overload accumulator on indicator	0: off 1: on	1	Actual	Actual	04C0H
P12.18	Alarm indicator	0: off 1: on	1	Actual	Actual	04C1H
P12.19	Power off undervoltage fault disabled	0: Enabled 1: Disabled	1	0	Run&Stop	04C2H

P12.01	Drive healthy				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0～1				
Change mode	Actual				

Indicates the drive is in the trip state or not.

0: off

1: on

NOTE: When the drive is alarming, the value of P12.01 is still 1.

P12.02	Ramp hold by high voltage threshold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	1				
Change mode	Stop Only				

0: off

1: on

Refer to the description of P12.03 for details.

P12.03	High voltage threshold				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	220V: 350V～370V 400V: 750V～780V 690V: 1000V～1125V				
Default	220V: 370V 400V: 780V 690V: 1125V				
Change mode	Stop Only				

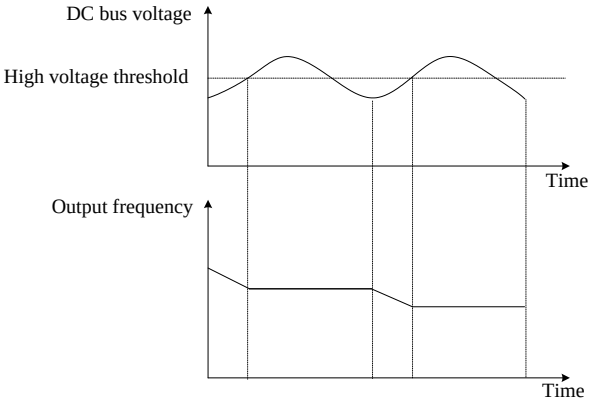


Figure 2-12-1 High voltage threshold

During deceleration running, the actual motor speed may be higher than the output synchronized speed of the drive due to the load inertia. At this time, the motor will feed the energy back to the drive, resulting in the voltage rise on the drive DC

bus. If no measures being taken, tripping will occur due to over voltage.

When P12.02=0, DC bus voltage rises once above situations happen until overvoltage protection The drive produce overvoltage trip (F002).

When P12.02=1, the overvoltage stall protection function enable. during the deceleration running, the drive detects the bus voltage and compare it with the stall overvoltage point. If the bus voltage exceeds the stall overvoltage point, the drive will stop reducing its output frequency. When the detected bus voltage is lower than the point, the deceleration running will be restored.

P12.04	**Overload pre-alarm**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	1				
Change mode	Stop Only				

The parameter is used to select whether the pre-overload alarm function is effective.

0: off

1: on

P12.05	**Overload pre-alarm threshold**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	80.0%～150.0%				
Default	130.0%				
Change mode	Run&Stop				

P12.06	**Overload pre-alarm delay time**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～60.0s				
Default	5.0s				
Change mode	Run&Stop				

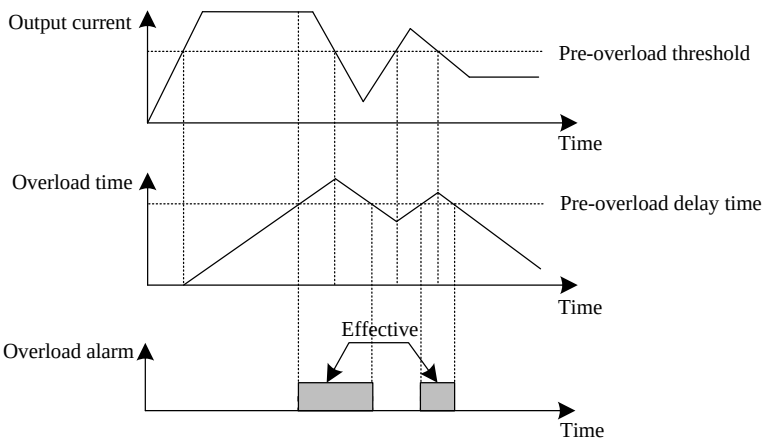


Figure 2-12-2 Pre-overload alarm

Overload pre-alarm threshold defines the current range of overload pre-alarm. Motor over load pre-alarm current is indicated by the percentage of motor rated current, the setup value must be less than 150% of motor rated current. Overload pre-alarm delay time (P12.06) defines delay time after drive output current exceeds the setup value of P12.05, the terminal outputs overload pre-alarm signal.

When drive output current is larger than the setup value of P12.05, time of overload calculator counting increases; when drive output current is less than the setup value of P12.05, time of overload calculator counting decreases until zero. The rate of increasing and decreasing is the same.

When time of drive overload calculator counting exceeds the setup value of P12.06, overload pre-alarm enable, and the keypad displays H002.

P12.07	**Auto reset**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～100				
Default	0				
Change mode	Stop Only				

P12.08	**Auto reset delay**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	2.0s～20.0s				
Default	5.0				
Change mode	Stop Only				

If P12.07 is set to 0, then no auto reset attempts are made. Any other value will cause the drive to automatically reset following a trip for the number of times programmed.

P12.08 defines the time between the trip and the auto reset.

The actual auto reset time:

- When the time defined by P12.08 is shorter than the shortest reset time, the actual auto reset time is the shortest reset time. About the shortest waiting time for resetting each trip, refer to ***HD700 User Manual*** chapter 5 Troubleshooting.
- When the time defined by P12.08 is longer than the shortest reset time, the actual auto reset time is the time defined by P12.08.

NOTE:

- The reset count is only incremented when the trip is the same as the previous trip. When the reset count reaches the programmed value, any further trip of the same value will not cause an auto-reset.

  For example:

  P12.07=10, the drive continuously initiates F001 trips in a period. The drive initiates a F002 trip after auto reset 5 times. Then F002 trip will be auto reset 10 times.
- If there has been no trip for 5 minutes then the reset count is cleared.
- F001 can be reset automatically, but the auto reset delay time is equal to or more than 10 senconds.
- Auto reset will not occur on F001, F018, F020, F30 or above F030 trips.
- When a manual reset occurs, the auto reset counter is reset to zero.

P12.09	Input phase loss delay time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～3000.0s				
Default	0.1s				
Change mode	Stop Only				

If set P12.09 to non-zero value, input phase loss always occurs in the set time, then the drive alarms F004 fault.

If set P12.09 to 0.0, shield F004 fault.

NOTE: If the input phase loss is not stable, the timer will execute decresing or increasing operation and will not be reset.

P12.10	Output phase loosing				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Stop Only				

The parameter is used to select that drive output phase loosing protection is enabled or disabled. When P12.10=1, output phase loosing protection is disabled, the drive will not initiate a F005 trip. Please carefully change this parameter value.

P12.11	Motor overload protection mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	1				
Change mode	Run&Stop				

0: P12.11＝0, Common motor (with low speed compensation)

Because the ventilation effect of common motor deteriorates in low speed running state, relevant electronic thermal protection parameters should also be adjusted; low speed compensation of motor's protection mode means when the running frequency is lower than 50% drive maximum running frequency, motor's overload protection value will be decreased.

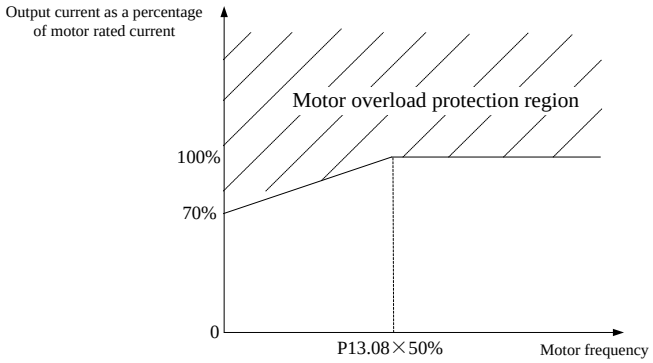


Figure 2-12-3 Motor overload protection mode for common motor

For example:

Motor rated frequency is 50.00Hz, when output frequency is 10Hz, the corresponding overload protection action point

is: $\frac{100-70}{25-0}$ ×10%＋70%=82% motor rated current.

When output frequency is 10Hz and output current is 82% motor rated current, the motor overload protection mode should be enabled.

1: Variable frequency motor (without low speed compensation)

The variable frequency motor specially used by drive applies forced air-cooling, the ventilation effect will not be affected by spinning speed, and the protection parameters need not be adjusted during low speed running.

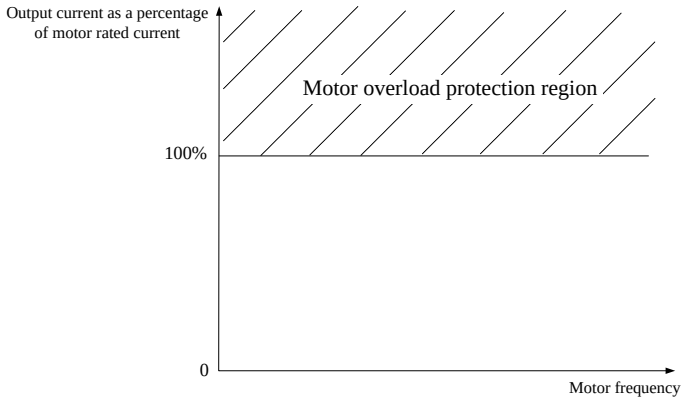


Figure 2-12-4 Motor overload protection mode for variable frequency motor

When output frequency is 0.00Hz to maximum output frequency and output current is 100% motor rated current, the motor overload protection mode should be enabled.

P12.12	**Motor overload protection factor**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～(drive rated current/motor rated current)×100%				
Default	100%				
Change mode	Run&Stop				

The parameter is used to adjust overload protection delay time.

The ratio of drive rated output current and motor rated current defines setting range of the parameter's value:

0%～(drive rated output current÷motor rated current)×100%

For example:

When drive rated output current is 10A and motor rated current is 5A, then the setting range of P12.12 value is 0% to 200.0%.

When drive rated output current is 5A and motor rated current is 10A, then the setting range of P12.12 value is 0% to 50.0%.

When the ratios of drive rated output current and motor rated current are the same, the greater the P12.12 value is, the longer the motor overload protection delay time is. Conversely, the time is shorter.

When motor overload protection factor is set to 0, motor overload protection is disabled.

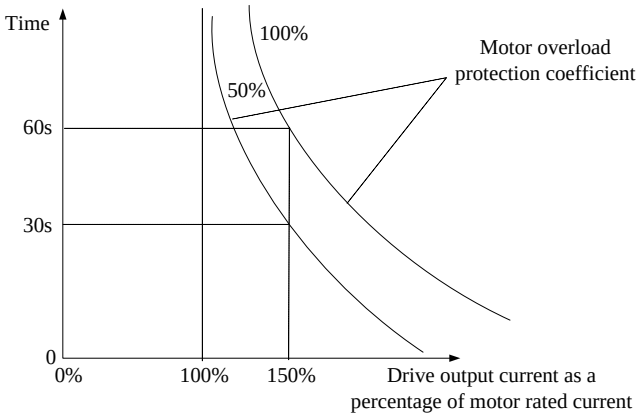


Figure 2-12-5 Motor overload protection

When P12.12=100%, and drive output current is 150% motor rated current, then motor overload protection delay time is 60s.

For the selected motor, when drive output current is different, motor overload protection delay time is different. When P12.12=100%, as shown in the below table:

Table 2-12-1 Motor overload protection delay time

drive output current/ motor rated current	**P12.12＝100%, motor overload protection delay time**
1.1	3000s
1.2	2000s
1.3	500s
1.4	100s
1.5	60s
1.6	30s
1.7	10s
1.8	3s

For the different setup value of P12.12, the actual overload protection delay time= (P12.12=100%, overload protection delay time)×P12.12

When motor overload protection is enabled, the drive initiates a F10 trip and stops by stop mode (P03.10).

NOTE:

- When drive output current is less than motor rated current, the overload protection is disabled.
- When drive rated current exceeds motor rated current, please do not set the value of the parameter too large to prevent motor overheating.

P12.13	**Alarm display control**				
Coding	RW	US	PT	ND	PS
Range	0～1				
Default	1				
Change mode	Run&Stop				

The parameter defines whether the keypad displays alarm code when the drive is alarming.

0: not display

1: display

P12.14	External fault				
Coding	RW	US	PT	ND	PS
	1			■	
Range	0～1				
Default	0				
Change mode	Run&Stop				

If the parameter is set to 1, the drive will initiate a F018 trip. In practice, the parameter is controlled by one terminal of DI1 to DI7.

For example, set P09.02=12.14, when DI status is 1, the drive initiates a F018 trip.

NOTE: When one of DI terminals selects the function, the value of P12.14 is changed only according to the relevant terminal status, not changed through the keypad.

P12.15	Reset trip				
Coding	RW	US	PT	ND	PS
	■				
Range	0～1				
Default	0				
Change mode	Run&Stop				

If the parameter is set to 1, the trip can be reset after eliminating fault conditions. Except ≥F030 trip, about the shortest waiting time for resetting each trip, refer to ***HD700 User Manual*** chapter 5 Troubleshooting.

In practice, the parameter is controlled by DI terminal. When one of DI terminals selects the function, the value of P12.15 is changed only according to the relevant terminal status, not changed through the keypad.

For example: set P09.02=12.15, after eliminating fault conditions, DI1 status is 1, the trip can be reset, the drive status is healthy (P12.01=1).

P12.16	Under voltage indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0～1				
Change mode	Actual				

The parameter is used to indicate if the DC bus voltage is lower than under voltage limit. When the DC bus voltage is lower than under voltage limit, the parameter is set to 1 and output indication signal, block IGBT and a F003 trip is initiated.

P12.17	Overload accumulator on indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0～1				
Change mode	Actual				

When drive output current exceeds the value defined in P12.05, time is longer than overload pre-alarm delay time (P12.06), and overload accumulator on indicator is set to 1, the drive alarms H002.

P12.18	Alarm indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0～1				
Change mode	Actual				

The parameter is used to indicate whether the drive is in the alarm state.

0: off

1: on

P12.19	Power off undervoltage fault disabled				
Coding	RW	US	PT	ND	PS
	■				
Range	0～1				
Default	0				
Change mode	Run&Stop				

The parameter is used to select whether P12.01 status changes when the drive powers off.

0: The drive powers off in the standby mode, P12.01 (drive healthy) display will be changed to 0 from 1. By default, Relay 1 acts.

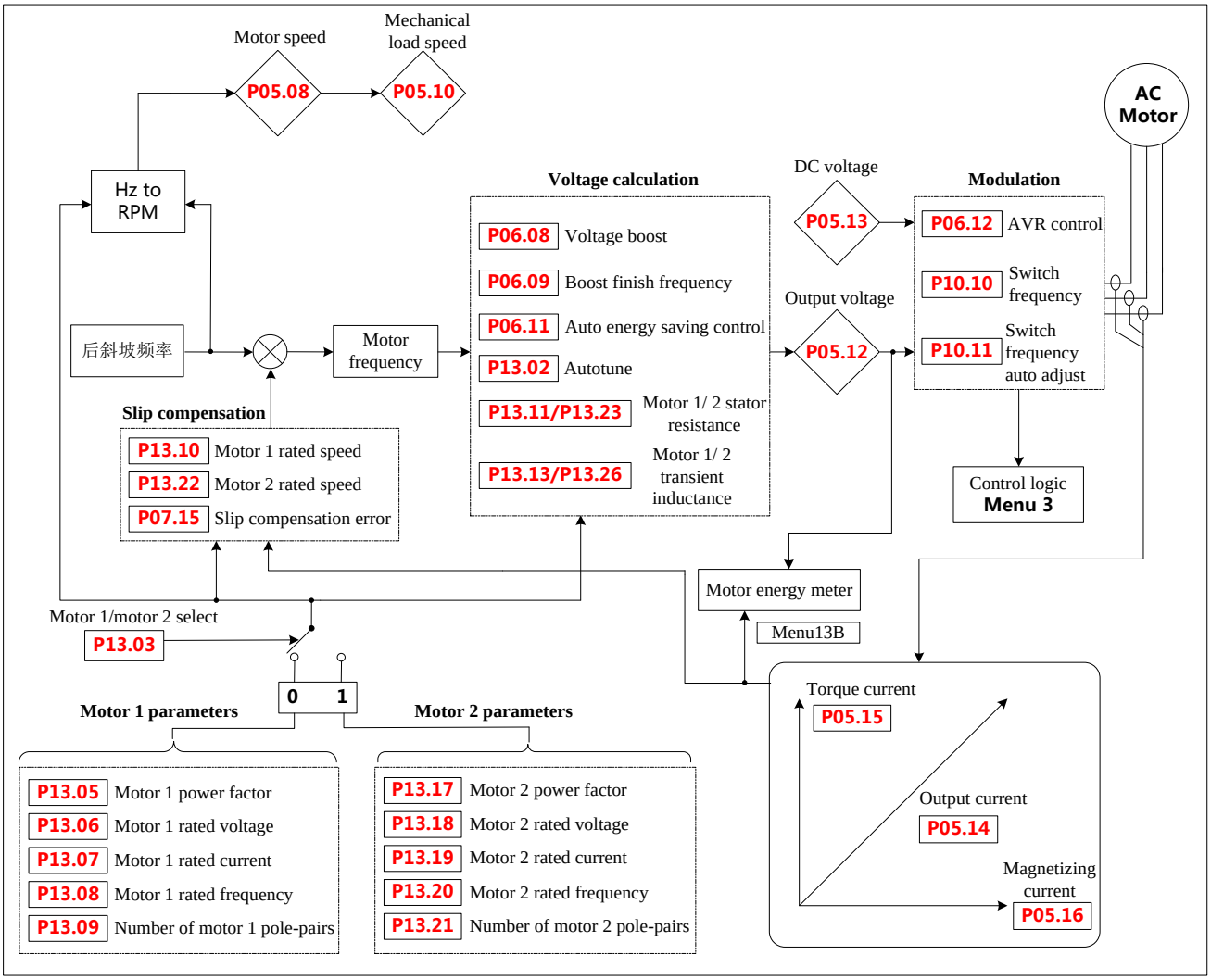
1: The drive powers off in the standby mode, P12.01 (drive healthy) display will keep 1. By default, Relay 1 do not act.

2.13 Menu P13: Motor

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P13.01	Motor voltage control mode	0: V/F 1: open loop vector	1	0	Stop Only	0514H
P13.02	Autotune	0: disabled 1: auto-tune 1 (run a time) 2: auto-tune 2 (run once a time) 3: backup	1	0	Stop Only	0515H
P13.03	Motor1/ motor 2 select	0: motor 1 1: motor 2	1	0	Stop Only	0516H
P13.04	Reserved	–	–	–	–	–
P13.05	Motor1 power factor	0.00～1.00	0.01	0.85	Stop Only	0518H
P13.06	Motor1 rated voltage	200V: 0V～240V 400V: 0V～480V 690V: 0V～690V	1V	200V: 220V 400V: 380V 690V: 660V	Stop Only	0519H
P13.07	Motor1 rated current	G or P type: 0.1A～rated current×1.2 GP type: 0.1A～P type rated current	0.1A	By model	Stop Only	051AH
P13.08	Motor1 rated frequency	1.00Hz～300.0Hz	0.01Hz	50.00Hz	Stop Only	051BH
P13.09	Number of motor1pole-pairs	0: auto 1: 2 poles 2: 4 poles 3: 6 poles 4: 8 poles	1	2	Stop Only	051CH
P13.10	Motor1 rated speed	0rpm～18000rpm	1rpm	0rpm	Stop Only	051DH
P13.11	Motor1 stator resistance	0.000Ω～60.000Ω	0.001Ω	0	Stop Only	051EH
P13.12	Reserved	–	–	–	–	–
P13.13	Motor1 transient inductance	0.00%～50.00%	0.01%	By model	Stop Only	0520H
P13.14	Reserved	–	–	–	–	–
P13.15	Reserved	–	–	–	–	–
P13.16	Reserved	–	–	–	–	–
P13.17	Motor2 power factor	0.00～1.00	0.01	0.85	Stop Only	0524H
P13.18	Motor2 rated voltage	200V: 0V～240V 400V: 0V～480V 690V: 0V～690V	1V	200V: 220V 400V: 380V 690V: 660V	Stop Only	0525H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P13.19	Motor2 rated current	G or P type: 0.1A～rated current×1.2 GP type: 0.1A～P type rated current	0.1A	By model	Stop Only	0526H
P13.20	Motor2 rated frequency	1.00Hz～300.0Hz	0.01Hz	50.00Hz	Stop Only	0527H
P13.21	Number of motor2 pole-pairs	0: auto 1: 2 poles 2: 4 poles 3: 6 poles 4: 8 poles	1	2	Stop Only	0528H
P13.22	Motor2 rated speed	0rpm～18000rpm	1rpm	0rpm	Stop Only	0529H
P13.23	Motor2 stator resistance	0.000Ω～60.000Ω	0.001Ω	0	Stop Only	052AH
P13.24	Reserved	–	–	–	–	–
P13.25	Reserved	–	–	–	–	–
P13.26	Motor2 transient inductance	0.00%～50.00%	0.01%	By model	Stop Only	052DH

Menu 13 Logic diagram



P13.01	Motor voltage control mode				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0: V/F 1: open loop vector				
Default	1				
Change mode	Stop Only				

0: V/F

1: open loop vector

P13.02	Autotune (P00.17)				
Coding	RW	US	PT	ND	PS
	■		■		
Range	0～3				
Default	0				
Change mode	Stop Only				

0: no action

1: static autotune1 (first run)

When P13.02=1, once there is a run order for the first time, the drive will do the static auto-tune. After finished, P13.02=0, the results are saved into EEPROM and the drive will be in disabled or stopped condition.

2: static autotune2 (every run)

When P13.02=2, every run order is received, the drive will do the autotune. After the static autotune, the drive will save the results into the EEPROM, and P0.17=2, and the drive is running.

3: Reserved

P13.03	Motor1/motor2 select				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: motor 1 1: motor 2				
Default	0				
Change mode	Stop Only				

The parameter is used to switch motors in motor1 and motor2.

0: motor1

1: motor2

When motor2 parameters are selected, changes as below:

Related motor2 parameters are enabled.

Related motor parameters in Menu 0 are motor2 parameters.

For example:

P13.08=50.00Hz, P13.20=60.00Hz

When P13.03＝0, P00.14＝50.00Hz;

When P13.03＝1, P00.14＝60.00Hz.

NOTE: Each time this parameter is changed the accumulator for motor thermal protection is reset to zero.

P13.04	Reserved				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P13.05	Motor power factor (P00.19)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0.00～1.00				
Default	0.85				
Change mode	Stop Only				

The power factor is used in conjunction with the motor rated current (P13.07) to calculate the rated active current and magnetising current of the motor. The rated active current is used extensively to control the drive, and the magnetising current is used in vector mode Rs compensation.

NOTE: P13.05 should be set to the motor power factor before an autotune is carried out.

P13.06	Motor 1 rated voltage (00.13)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	200V: 0V～240V 400V: 0V～480V 690V: 0V～690V				
Default	200V: 220V 400V: 380V 690V: 660V				
Change mode	Stop Only				

The motor rated voltage should be set at the machine nameplate value for rated voltage.

P13.07	Motor1 rated current (P00.14)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	G or P type: 0.1A～rated current×1.2 GP type: 0.1A～P type rated current				
Default	By model				
Change mode	Stop Only				

The motor rated current should be set at the machine nameplate value for rated current.

P13.08	Motor1 rated frequency (P00.15)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	1.00Hz～300.0Hz				
Default	50.00Hz				
Change mode	Stop Only				

The motor rated frequency should be set at the machine nameplate value for rated frequency.

P13.09	Number of motor1 pole-pairs				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0, 1, 2, 3, 4				
Default	2				
Change mode	Stop Only				

0: auto (according to rated frequency and rated Revolutions Per Minute)

$$\text{Pole pairs}=\frac{60\times\text{Rated frequency}}{\text{rpm}}$$ rounded to the nearest even number.

For example:

Rated frequency is 50Hz. Rated speed is 1460rpm.

$$N=\frac{60f}{P}$$

$$P=\frac{60f}{N}=\frac{60\times 50}{1460}=2.054$$

It means that the motor has 2 pairs of poles (4 poles motor).

1: 2 poles

2: 4 poles

3: 6 poles

4: 8 poles

P13.10	Motor1 rated speed (P00.16)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0rpm～18000rpm				
Default	0rpm				
Change mode	Stop Only				

This parameter should be set to the asynchronous motor nameplate value, which should give the correct rpm for a hot machine.

If set P13.10 to 0, the value of P13.09 (Number of motor 1 pole-pairs) is 2 by default. If set P13.10 to other number, the drive will automatically calculate the number of motor 1 pole-pairs and the value of P13.09 will be changed to 0 automatically.

P13.11	Motor1 stator resistance (P00.18)				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0.000Ω～60.000Ω				
Default	By model				
Change mode	Stop Only				

After an autotune is carried out (set P13.02=1 or 2), the drive will refresh this parameter automatically.

P13.12	Reserved				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P13.13	Motor1 transient inductance				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0.00%～50.00%				
Default	By model				
Change mode	Stop Only				

P13.14	Reserved
P13.15	Reserved
P13.16	Reserved

Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P13.17	Motor2 power factor				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0.00～1.00				
Default	0.85				
Change mode	Stop Only				

The power factor is used in conjunction with the motor rated current (P13.19) to calculate the rated active current and magnetising current of the motor. The rated active current is used extensively to control the drive, and the magnetising current is used in vector mode Rs compensation.

NOTE: P13.17 should be set to the motor power factor before an autotune is carried out.

P13.18	Motor2 rated voltage				
Coding	RW	US	PT	ND	PS
	■	■			
Range	200V: 0V～240V 400V: 0V～480V 690V: 0V～690V				
Default	200V: 220V 400V: 380V 690V: 660V				
Change mode	Stop Only				

The motor rated voltage should be set at the machine nameplate value for rated voltage.

P13.19	Motor2 rated current				
Coding	RW	US	PT	ND	PS
	■	■			
Range	G or P type: 0.1A～rated current×1.2 GP type: 0.1A～P type rated current				
Default	By model				
Change mode	Stop Only				

The motor rated current should be set at the machine nameplate value for rated current.

P13.20	Motor2 rated frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	1.00Hz～300.0Hz				
Default	50.00Hz				
Change mode	Stop Only				

The motor rated frequency should be set at the machine nameplate value for rated frequency.

P13.21	Number of motor2 pole-pairs				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0, 1, 2, 3, 4				
Default	2				
Change mode	Stop Only				

0: auto (according to rated frequency and rated Revolutions Per Minute)

$$\text{Pole pairs}=\frac{60\times\text{Rated frequency}}{\text{rpm}}$$ rounded to the nearest even number.

For example:

Rated frequency is 50Hz. Rated speed is 1460rpm.

$$N=\frac{60f}{P}$$

$$P=\frac{60f}{N}=\frac{60\times 50}{1460}=2.054$$

It means that the motor has 2 pairs of poles (4 poles motor).

1: 2 poles

2:4 poles

3: 6 poles

4: 8 poles

P13.22	Motor2 rated speed				
Coding	RW	US	PT	ND	PS
	■	■			
Range	1rpm～18000rpm				
Default	1460rpm				
Change mode	Stop Only				

The motor rated speed should be set at the asynchronous machine nameplate value for rated speed.

If set P13.22 to 0, the value of P13.21 (Number of motor 2 pole-pairs) is 2 by default. If set P13.22 to other number, the drive will automatically calculate the number of motor 2 pole-pairs and the value of P13.21 will be changed to 0 automatically.

P13.23	Motor2 stator resistance				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0.000Ω～60.000Ω				
Default	0				
Change mode	Stop Only				

After an autotune is carried out, the drive will refresh the parameter automatically.

P13.24	Reserved				
P13.25	Reserved				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P13.26	Motor2 transient inductance				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0.00%～50.00%				
Default	By model				
Change mode	Stop Only				

2.14 Menu P14: Textile function

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P14.01	Textile function enable	0: off 1: on	1	0	Stop Only	0578H
P14.02	Centre of textile frequency	0.00Hz～max. frequency	0.01Hz	0.00Hz	Run&Stop	0579H
P14.03	Preset textile frequency	0.00Hz～max. frequency	0.01Hz	0.00Hz	Run&Stop	057AH
P14.04	Run time of Preset textile frequency	0.0s～3600.0s	0.1s	0.0s	Run&Stop	057BH
P14.05	Textile frequency	0.0%～50.0% (map to P14.02)	0.1%	0.0%	Run&Stop	057CH
P14.06	Jump frequency	0.0%～50.0% (map to P14.05)	0.1%	0.0%	Run&Stop	057DH
P14.07	Textile period	0.1s～1000.0s	0.1s	10.0s	Run&Stop	057EH
P14.08	Triangle rise time	0.0%～100.0% (map to P14.07)	0.1%	50.0%	Run&Stop	057FH
P14.09	Pause textile	0: off 1: on	1	0	Run&Stop	0580H
P14.10	Reference of length	0～60000 (unit length)	1	1000	Run&Stop	0581H
P14.11	Actual length	0～30000 (unit length)	1	Actual	Actual	0582H
P14.12	Pulse number per unit length	0.1～P14.21	0.1	100.0	Run&Stop	0583H
P14.13	Actual length meets the reference	0: (P14.11)＜(P14.10) 1: (P14.11)≥(P14.10)	1	Actual	Actual	0584H
P14.14	Reference of number counting	1～(P14.21)	1	1000	Run&Stop	0585H
P14.15	Set number	1～(P14.14)	1	1000	Run&Stop	0586H
P14.16	Actual number meets reference number	0: lees than (P14.14) 1: equals (P14.14)	1	Actual	Actual	0587H
P14.17	Actual number meets set number	0: lees than (P14.15) 1: equals (P14.15)	1	Actual	Actual	0588H
P14.18	Reset length counting	0: off 1: on	1	0	Run&Stop	0589H
P14.19	Reset number counting	0: off 1: on	1	0	Run&Stop	058AH
P14.20	Reference length upper limit	0～30000	1	1000	Stop Only	058BH
P14.21	Pulse number per unit length upper limit	0.1～3000.0	0.1	100.0	Stop Only	058CH
P14.22	Reference number counting upper limit	1～30000	1	1000	Stop Only	058DH

NOTE: (Pxx.xx) means the value of Pxx.xx.

Textile function is used in textile, chemical fiber industry and at the occasions that need traversing or winding function. Its typical operation as below:

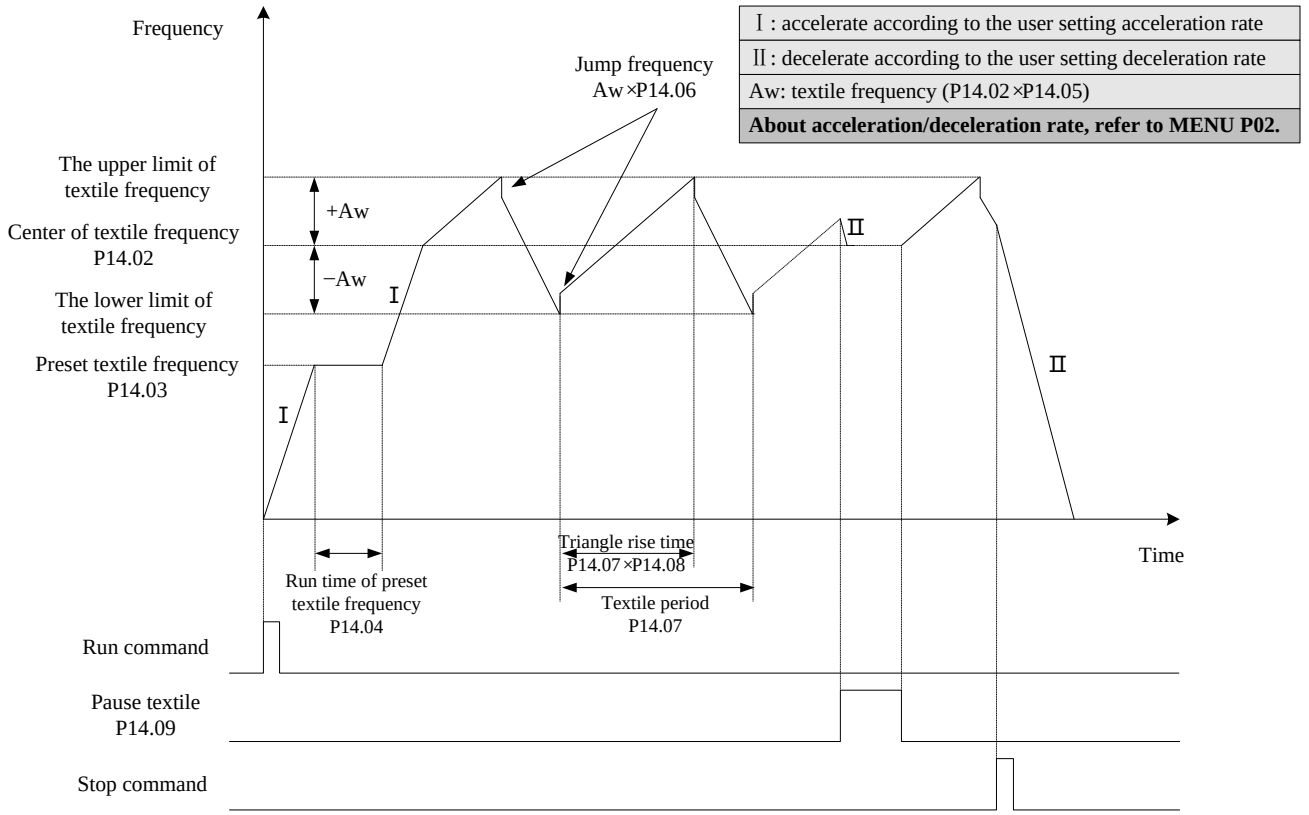


Figure 2-14-1 textile running curve

Usually a textile frequency process as follows:

- Accelerate to preset textile frequency (P14.03) according to acceleration rate the user selected.
- Keep the frequency constant, the hold time is the run time of preset textile frequency (P14.04).
- Keep on accelerating to center of textile frequency (P14.02).
- Recycle run according to the setting textile frequency (P14.05), jump frequency (P14.06), textile period (P14.07) and triangle rise time (P14.08).
- When stop command is enabled, the drive stops according to deceleration rate and stop mode the user selected.

NOTE: In terminal control mode, run and stop command are level effective.

P14.01	Textile function enable				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

The parameter is used to select textile function is enabled or disabled.

Set P14.01=0, textile function is enabled.

Set P14.01=1, textile function is disabled.

NOTE: When jog or PLC running, textile function is abolished automatically.

P14.02	Center of textile frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～maximum frequency				
Default	0.00Hz				
Change mode	Run&Stop				

The center of textile frequency is output frequency that rise and fall around the center of textile frequency according to textile period and rise time.

P14.03	Preset textile frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～maximum frequency				
Default	0.00Hz				
Change mode	Run&Stop				

P14.04	Run time of preset textile frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～3600.0s				
Default	0.0s				
Change mode	Run&Stop				

After the textile function is enabled, every time a textile operation, the drive run to the preset textile frequency first according to the selected acceleration or deceleration rate, and keep output frequency unchanged. The hold time is run time of preset textile frequency (P14.04).

P14.05	Textile frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～50.0% (map to P14.02)				
Default	0.0%				
Change mode	Run&Stop				

NOTE:

- The value of P14.05 is a percentage mapping to center of textile frequency (P14.02).
- The parameter defines the amplitude of textile frequency: Aw＝P14.02×P14.05.
- The upper limit of textile frequency is P14.02 + Aw.
- The lower limit of textile frequency is P14.02 – Aw.

P14.06	Jump frequency				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～50.0% (map to P14.05)				
Default	0.0%				
Change mode	Run&Stop				

NOTE:

- The value of P14.06 is a percentage mapping to textile frequency (P14.05).
- The parameter defines jump frequency: Aw×P14.06.
- The jump frequency is not a fixed value. It is related with P14.02 and P14.05.

P14.07	Textile period				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.1s～1000.0s				
Default	10.0s				
Change mode	Run&Stop				

In textile frequency running, textile period is the time that rise and fall around the center textile frequency.

P14.08	Triangle rise time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～100.0% (map to P14.07)				
Default	50.0%				
Change mode	Run&Stop				

NOTE: The value of P14.08 is a percentage mapping to textile period (P14.07). The parameter is used to define triangle wave rise time. The actual triangle wave rise time is P14.07×P14.08.

P14.09	Pause textile				
Coding	RW	US	PT	ND	PS
	■				
Range	0～1				
Default	0				
Change mode	Run&Stop				

In the process of textile, if pause textile is enabled (P14.09=1), there are two cases according to the running frequency at that time:

- When the running frequency is less than center textile frequency, the drive will accelerate to center textile frequency (P14.02) according to acceleration rate the user selected, and keep output frequency.
- When the running frequency exceeds center textile frequency, the drive will decelerate to center textile frequency (P14.02) according to deceleration rate the user selected, and keep output frequency.

When the drive is running, if pause textile is disabled (P14.09=0), there are two cases according to running status at that time:

- Triangle wave rise stage
  The drive rises from center textile frequency according to triangle wave rise time, and keeps on textile running.
- Triangle wave fall stage
  The drive falls from center textile frequency according to triangle wave fall time, and keeps on textile running.

NOTE: when stop command is enabled, pause textile (P14.09) is disabled automatically.

For example:

Other parameters for the default parameters, set as below:

Set P01.02＝120.00, the maximum running frequency is 120.00Hz.

Set P02.04＝12.0, acceleration rate1 is 12.0s.

Set P02.05＝6.0, deceleration rate1 is 6.0s.

Set P14.01＝1, textile function is enabled.

Set P14.02＝80.00, center of textile frequency is 80.00Hz.

Set P14.03＝45.00, preset textile frequency is 45.00Hz.

Set P14.04＝6.0, run time of preset textile frequency is 6.0s.

Set P14.05＝25.0, textile frequency is Aw＝P14.02×25.0%＝20.00Hz. The upper limit of textile frequency is 100.00Hz and the lower limit of textile frequency is 60.00Hz.

Set P14.06＝25.0, jump frequency is Aw×25.0%＝5.00Hz.

Set P14.07＝17.5, textile period is 17.5s.

Set P14.08＝60.0, triangle rise time is P14.07×60.0%＝10.5s.

Press "RUN" key, and the drive will output as the figure below.

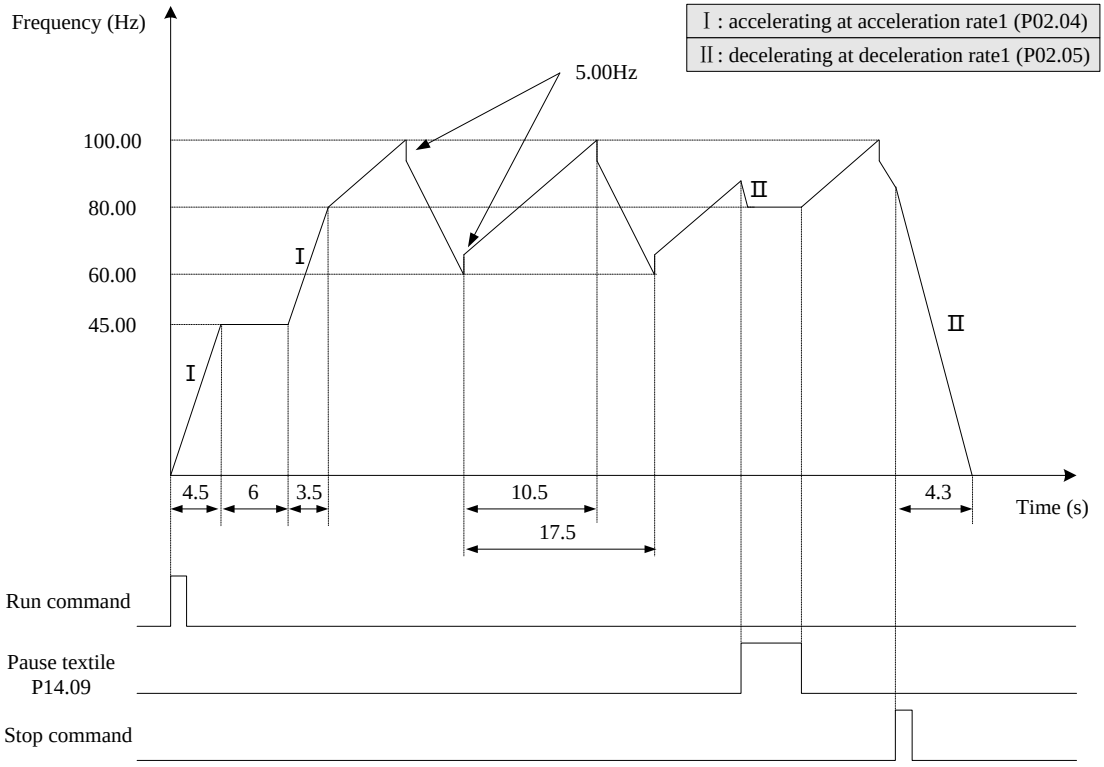


Figure 2-14-2 Textile running curve

P14.10	Reference of length				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～60000 (unit length)				
Default	1000 (unit length)				
Change mode	Run&Stop				

P14.11	Actual length				
Coding	RW	US	PT	ND	PS
Range	0～30000 (unit length)				
Change mode	Actual				

P14.12	Pulse number per unit length				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.1～6000.0				
Default	100.0				
Change mode	Run&Stop				

NOTE:

- Do not change the value of P14.12 after length control, if not it will cause wrong results.
- Reference of length (P14.10), actual length (P14.11) and pulse number per unit length (P14.12) are used for length control.
- The actual length is counted through digital input terminal (DI6) input pulse signal (P09.23=1). The maximum frequency is 60.00Hz.
- Actual length (P14.11) = length counting pulse number/pulse number per unit length (P14.12)
- According to actual condition, the user defines the unit of length.
- The actual length (P14.11) is shown as integer, and the value behind the decimal point is omitted, but it can be accurate to one decimal place in internal calculation.

Table 2-14-1 Pulse number per unit length, ;length pulse number and actual length mapping table

Sum of length pulse		2	4	6	8	10
The value of P14.11 when the value of P14.12 is set to different value	P14.12＝0.8	2	5	7	10	12
	P14.12＝2.0	1	2	3	4	5
	P14.12＝2.4	0	1	2	3	4

P14.13	Actual length meets the reference				
Coding	RW	US	PT	ND	PS
Range	0～1				
Change mode	Actual				

NOTE:

- Length counting is counted through the digital input terminal (DI6) input pulse signal (P09.23=1). The maximum input frequency is 60.00Hz.
- When the actual length (P14.11) is more than or equal to reference of length (P14.10), P14.13 (actual length meets the reference) is set 1.
- If "actual length meets the reference" is selected by the multi-function digital output terminals (DO/Relay), P14.13=1, the related digital output terminals output ON signal.

  For example:

  Set P09.10=P14.13, then when P14.13=1, Relay 1 acts.

For example:

Set P14.10=4, reference of number counting is 4.

Set P14.12=3, pulse number per unit length.

The results as the figure below:

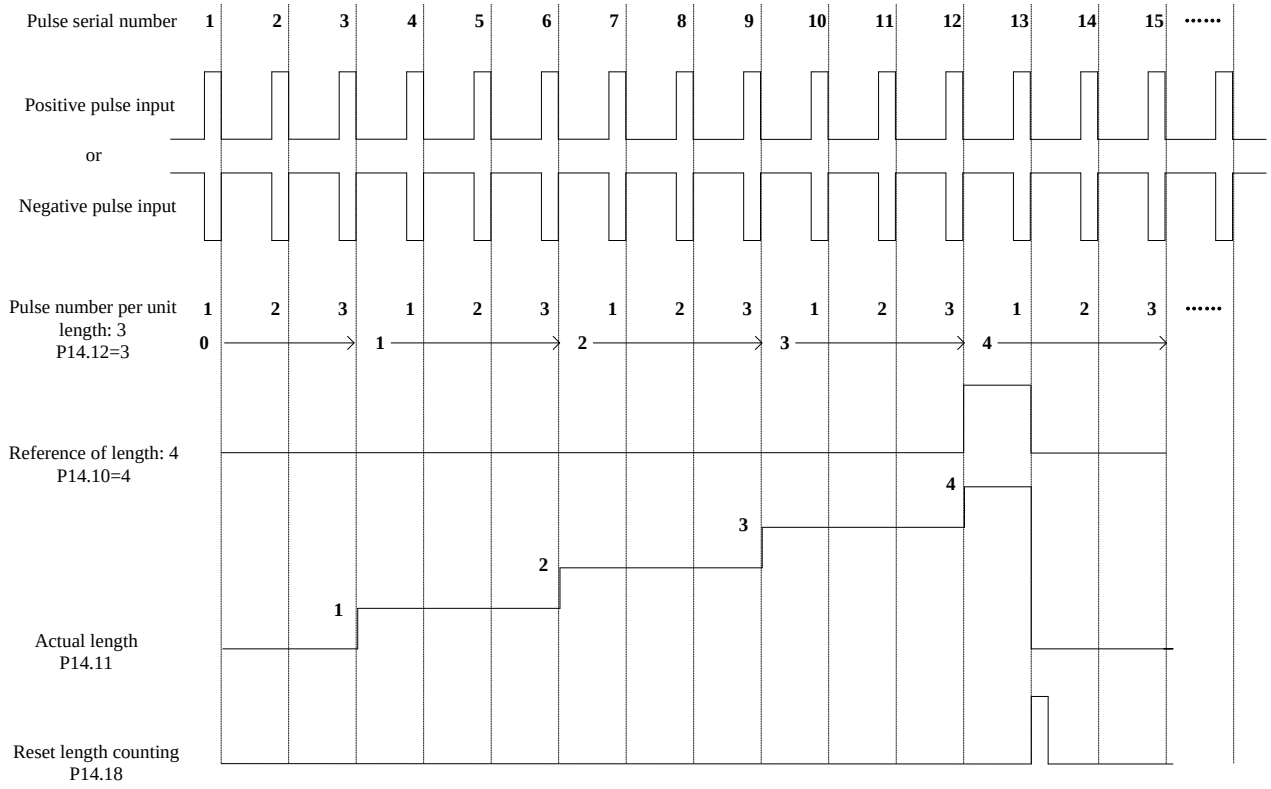


Figure 2-14-3 Length counting

P14.14	Reference of number counting				
Coding	RW	US	PT	ND	PS
	■	■			
Range	1～(P14.22)				
Default	1000				
Change mode	Run&Stop				

P14.15	Set number				
Coding	RW	US	PT	ND	PS
	■	■			
Range	1～ (P14.14)				
Default	1000				
Change mode	Run&Stop				

P14.16	Actual number meets reference number				
Coding	RW	US	PT	ND	PS
			■		
Range	0～1				
Change mode	Actual				

P14.17	Actual number meets set number				
Coding	RW	US	PT	ND	PS
			■		
Range	0～1				
Change mode	Actual				

NOTE:

- The number counting is counted through the digital input terminal (DI6) input pulse signal (P09.23 = 2), the maximum input frequency is 60.00Hz.
- When the actual number meets reference number counting (P14.14), P14.16=1, the counter is reset. When the next count pulse arrives, P14.16=0, the counter restarts counting.
- When the actual number meets set number counting (P14.15), P14.17=1, the counter continues to count. When the actual number meets reference number counting (P14.14), P14.17 is reset. Set number counting (P14.15) should be less than or equal to reference number counting (P14.14).
- If "actual number meets reference number" or "actual number meets set number" is selected by the multi-function digital output terminals (DO/Relay), P14.16=1 or P14.17=1, the related digital output terminals output ON signal.

P14.18	Reset length counting				
Coding	RW	US	PT	ND	PS
	■				
Range	0～1				
Default	0				
Change mode	Run&Stop				

When the parameter is set to 1, the length counting is reset to 0.

P14.19	Reset number counting				
Coding	RW	US	PT	ND	PS
	■				
Range	0～1				
Default	0				
Change mode	Run&Stop				

When the parameter is set to 1, the number counting is reset to 0.

For example:

Set P14.14=5, reference of number counting is 5.

Set P14.15=3, set number counting is 3.

The results as the figure below:

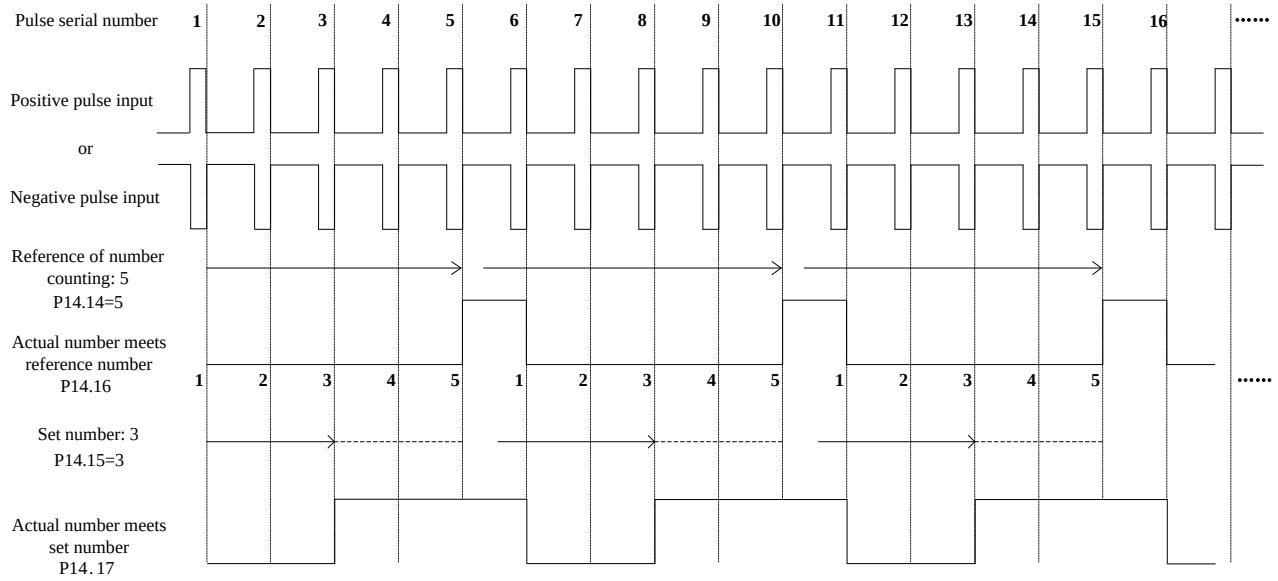

Pulse serial number
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 ……
Positive pulse input
or
Negative pulse input
Reference of number counting: 5
P14.14=5
Actual number meets reference number
P14.16
1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 ……
Set number: 3
P14.15=3
Actual number meets set number
P14.17

Figure 2-14-4 Number counting

P14.20	Reference length upper limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～30000				
Default	1000				
Change mode	Stop Only				

The parameter is used to limit the range of P14.10 value.

P14.21	Pulse number per unit length upper limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～30000				
Default	1000				
Change mode	Stop Only				

The parameter is used to limit the range of P14.12 value.

P14.22	Reference number counting upper limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～30000				
Default	1000				
Change mode	Stop Only				

The parameter is used to limit the range of P14.15 value.

2.15 Menu P15: PID controller

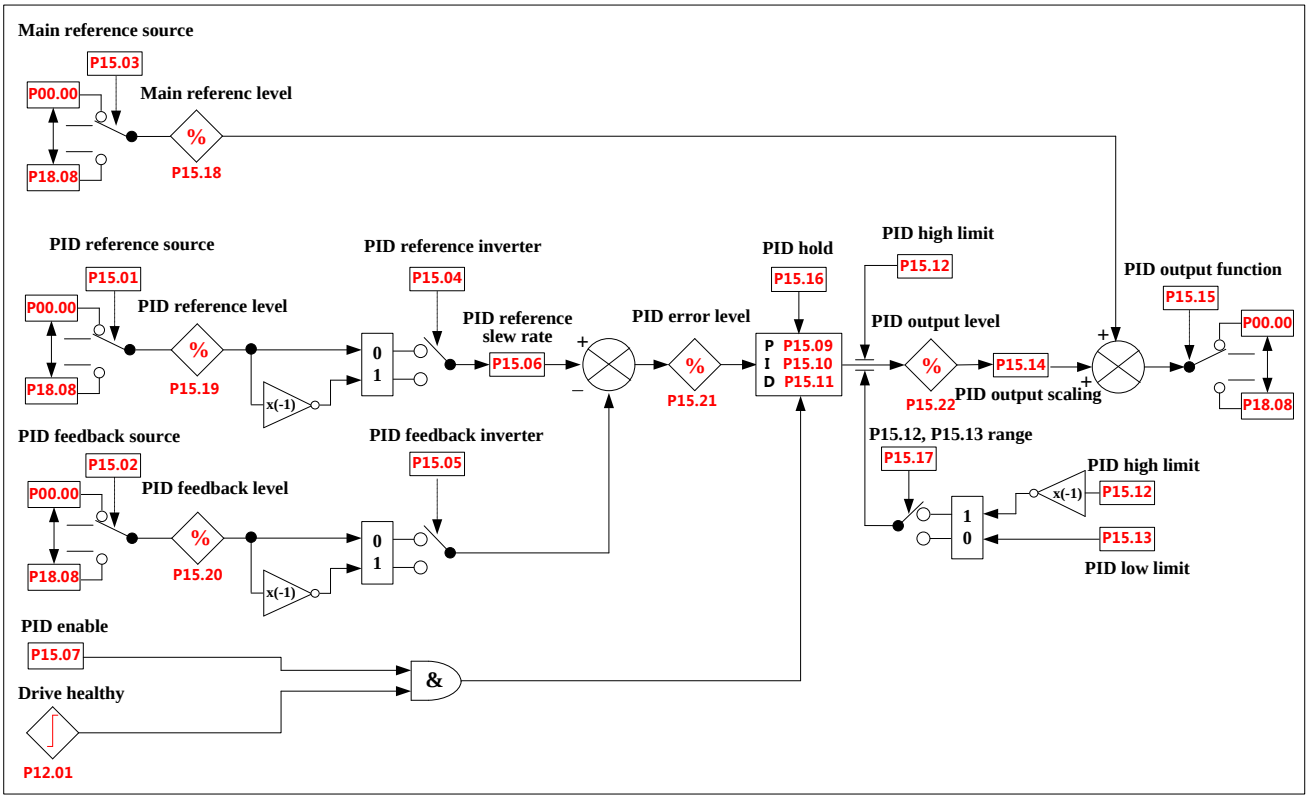
ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P15.01	PID reference source	P00.00～P18.08	0.01	P00.00*	Run&Stop	05DCH
P15.02	PID feedback source	P00.00～P18.08	0.01	P00.00*	Run&Stop	05DDH
P15.03	Main reference source	P00.00～P18.08	0.01	P00.00*	Run&Stop	05DEH
P15.04	PID reference inverter	0: off 1: on	1	0	Run&Stop	05DFH
P15.05	PID feedback inverter	0: off 1: on	1	0	Run&Stop	05E0H
P15.06	PID reference slew rate	0.0s～3200.0s	0.1	0.0	Run&Stop	05E1H
P15.07	PID enable	0: off 1: on	1	0	Run&Stop	05E2H
P15.08	Reserved	–	–	–	–	–
P15.09	PID proportional gain	0.000～4.000	0.001	1.000	Run&Stop	05E4H
P15.10	PID integral gain	0.000～4.000	0.001	0.500	Run&Stop	05E5H
P15.11	PID derivative gain	0.000～4.000	0.001	0.000	Run&Stop	05E6H
P15.12	PID high limit	0.0 %～100.0%	0.1	100.0%	Run&Stop	05E7H
P15.13	PID low limit	−100.0%～+100.0%	0.1	−100.0%	Run&Stop	05E8H
P15.14	PID output scaling	0.000～4.000	0.001	1.000	Run&Stop	05E9H
P15.15	PID output destination	P00.00～P18.08	0.01	P00.00*	Run&Stop	05EAH
P15.16	PID hold	0: off 1: on	1	0	Run&Stop	05EBH
P15.17	P15.12, P15.13 range	0: (P15.13)≤(P15.22)≤(P15.12) 1: －(P15.12)≤(P15.22)≤(P15.12)	1	0	Run&Stop	05ECH
P15.18	PID Main reference level	−100.0%～+100.0%	0.1%	Actual	Actual	05EDH
P15.19	PID reference level	−100.0%～+100.0%	0.1%	Actual	Actual	05EEH
P15.20	PID feedback level	−100.0%～+100.0%	0.1%	Actual	Actual	05EFH
P15.21	PID error level	−100.0%～+100.0%	0.1%	Actual	Actual	05F0H
P15.22	PID output level	−100.0%～+100.0%	0.1%	Actual	Actual	05F1H
P15.23	Sleep mode enable	0: Off 1: On	1	0	Stop Only	05F2H
P15.24	Sleep channel selector	P00.00～P18.08	0.01	P05.11	Stop Only	05F3H
P15.25	Sleep threshold	0.00Hz～P01.02 (P15.24＝P05.11) 0.0%～100.0% (P15.24＝other)	0.01Hz 0.1%	0.00Hz 0.0%	Stop Only	05F4H
P15.26	Sleep delay time	0.0s～3000.0s	0.1s	30.0s	Stop Only	05F5H
P15.27	Wakeup mode	0: Off 1: On	1	1	Stop Only	05F6H
P15.28	Wekeup channel selector	P00.00～P18.08	0.01	P15.20	Stop Only	05F7H
P15.29	Wakeup threshold	0.0%～100.0%	0.1%	0.0%	Stop Only	05F8H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P15.30	Wakeup delay time	0.0s～3000.0s	0.1s	0.0s	Stop Only	05F9H
P15.31	Reserved	–	–	–	–	–
P15.32	Reserved	–	–	–	–	–
P15.33	Reserved	–	–	–	–	–
P15.34	Sleep status indicator	0: Not sleep mode 1: Sleep mode	1	Actual	Actual	05FDH

NOTE: (Pxx.xx) means the value of Pxx.xx.

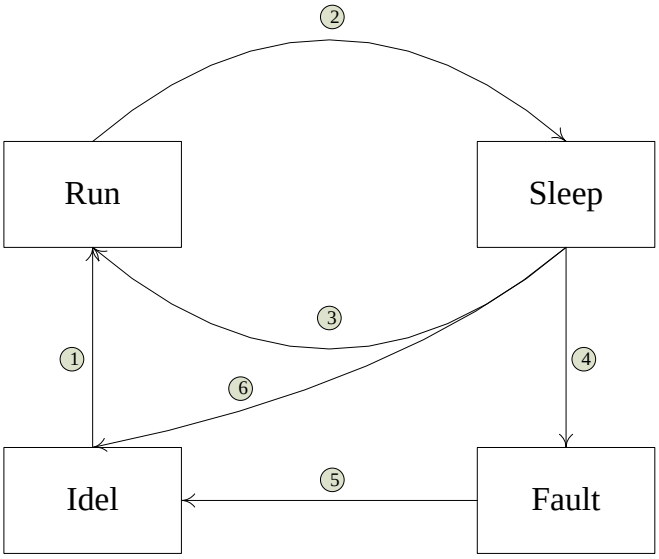
*NOTE: There is no actual parameter P00.00, the source default is P00.00 means to disable the PID.

Menu 15A Logic diagram



NOTE: The PID function is only active if the output destination is routed to a valid unprotected parameter. If only the indicator parameters are required, the destination parameter should be routed to an unused valid parameter.

Menu 15B Logic diagram



1. **The RUN command is valid and the drive switches to running state from idel state.**
2. **THE absolute value Of Sleep channel parameter (P15.24) is less than sleep threshold (P15.25) and it keeps over sleep delay time (P15.26), then the drive will switch to sleep state from running state.**
3. **When P15.27 = 0,the absolute value of the setup parameter of P15.28 (wakeup channel) is less than P15.29 (wakeup threshold) or When P15.27 = 1,the absolute value of the setup parameter of P15.28 (wakeup channel) is more than P15.29 (wakeup threshold) and it keeps over wakeup delay time (P15.30), then the drive will switch to wakeup mode from sleep mode .**
4. **The drive alarms the fault and the drive switches to fault state from sleep state.**
5. **The fault is cleared and reset , then the drive switches to idel state from fault state.**
6. **1. In the keypad control mode, press 'STOP' switch.**
   2. In terminal or keypad control mode, drive enable is valid.
   3. In 3-wire control mode, cancel 3-wire enabled.
   Meeting one of the three conditions, the drive switches to idel state from sleep state.

NOTE: In the sleep mode, the drive stops and the keypad displays '007'. Meanwhile, P15.34 = 1, it means the drive is in the sleep mode. If the drive quits sleep mode, P15.34 = 0.

P15.01	PID reference source				
P15.02	PID feedback source				
P15.03	Main reference source				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Run&Stop				

These parameters define the variables that are to be used as the input variables to the PID controller. All variable inputs to the PID are automatically scaled to variables having the range of ±100.0% or 0 to 100% (of the source parameter) if they are unipolar.

For example:

P15.01＝4.03 PID reference source is preset 3 (default: 20.00Hz).

P15.02＝1.21 PID feedback source is analogue input 2 frequency reference (AI2).

P15.03＝4.01 PID main reference source is preset 1 (default: 5.00Hz).

P01.21＝30.00Hz Analogue input 2 frequency reference is 30.00Hz.

P01.02＝50.00Hz Maximum frequency is 50.00Hz.

Then:

PID reference displays $P15.19=\frac{P04.03\times100\%}{P01.02}=\frac{20.00Hz\times100\%}{50.00Hz}=40\%$

PID feedback displays P15.20＝30.00Hz÷50.00Hz×100%＝60%

PID main reference displays P15.18＝5.00Hz÷50.00Hz×100%＝10%

When these input sources select bit parameters or selector parameters, they will be automatically convert into the percentage of the related parameters maximum value.

For example:

P15.01＝1.01, P15.03＝9.40

P01.01 range is 0 to 8. When P1.01＝1, PID reference is P15.19＝12.5%.

The value of P09.40 is only 0 and 1. When P09.04=1, PID main reference displays P15.18=0%. When P09.40=1, P15.18=100%.

NOTE:

Because the PID controller always automatically converts input and output variables into the percentage of their maximum value before operation, so does not require PID reference variables and feedback variables have the same physical unit. It makes flexible for setting input reference variables and feedback variables of the PID controller for HD700 drives.

For example:

PID feedback source is a pressure transmitter with a range of 0 to 10MPa and 0 to 10V, and the drive output is connected with AI2 terminal. To stabilize the pressure at the 5 MPa by using the PID controller, the user can make the following settings:

P15.01＝4.01 select preset 1 as PID reference source

P01.02＝50.00Hz set maximum frequency at 50Hz

P04.01＝25.00Hz set preset 1 at 25Hz

P15.02＝8.18 select AI2 as PID feedback source

From the above parameters setting, the PID reference is 50.0%. When feedback is 5MPa, the feedback variable is 50%.

P15.04	PID reference inverter				
P15.05	PID feedback inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0:off 1: on				
Default	0				
Change mode	Run&Stop				

These parameters can be used to invert the PID reference and source variables respectively.

For example:

P15.01＝4.04, P4.04＝30.00Hz

If P15.04＝1, then the PID reference is −30.00Hz.

P15.06	PID reference slew rate				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～3200.0s				
Default	0.0s				
Change mode	Run&Stop				

This parameter defines the time taken for the reference input to ramp from 0.0 to 100.0% following a 0 to 100% step change in input.

P15.07	PID enable				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

This parameter is used to determine whether PID function is enabled.

0: PID controller enabled, PID output is 0.

1: PID controller disabled

P15.08	Reserved				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P15.09	PID proportional gain				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.000～4.000				
Default	1.000				
Change mode	Run&Stop				

This is the proportional gain applied to the PID error.

Proportional gain depends on the present error. Proportional adjustment immediately respond to error. Once error generates, the PID controller is enabled. It makes the error of controlled variable reduced and the proportional gain increase for reducing the error.

A high proportional gain results in a large change in the output for a given change in the error. If the proportional gain is too high, the system can become unstable. In contrast, a small gain results in a small output response to a large input error, and a less responsive or less sensitive controller.

NOTE: If 15.09 is set to zero then the proportional action is disabled.

P15.10	PID integral gain				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.000～4.000				
Default	0.50				
Change mode	Run&Stop				

This is the gain applied to the PID error before being integrated.

As long as the error is not zero, the integrator attempts to minimize the error by adjusting the process control inputs. The control action will not change until the error is zero. The system is stable and the error is disappeared. The integral action is controlled by the integral gain. If integral gain is high, the integral action is better and dynamic response is fast. If not, the integral action is weak and the dynamic response is slow. If P15.10 is set to zero then the integral action is disabled.

P15.11	PID derivative gain				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.000～4.000				
Default	0.000				
Change mode	Run&Stop				

This is the gain applied to the PID error before being differentiated.

PID derivative gain is a prediction of future errors and based on current rate of change. If the PID derivative gain is set correctly, the overshoot and adjusting time will be reduced. Derivative action cannot be used independently. It is used with proportional action or integral action together.

NOTE:

- If the parameter is set too big then the derivative action is too strong. It may be cause oscillating and the PID output with a “peak” or “sudden jump”.
- If P15.11 is set to zero then the derivative action is disabled.

P15.12	PID high limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～100.0%				
Default	100.0%				
Change mode	Run&Stop				

P15.13	PID low limit				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−100.0%～+100.0%				
Default	−100.0%				
Change mode	Run&Stop				

These parameters are controlled by P15.17.

If P15.17=0, the high limit (P15.12) defines the maximum positive output for the PID controller and the lower limit (P15.13) defines the minimum positive or maximum negative output.

If P15.17=1, the high limit (P15.12) defines the maximum positive or negative magnitude for the PID controller output.

About examples refer to P15.17.

P15.14	PID output scaling				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0.000～4.000				
Default	1.000				
Change mode	Run&Stop				

The PID output is scaled by this parameter before being added to the main reference. After the addition to the main reference, the output is automatically scaled again to match the range of the destination parameter.

Example 1:

If P15.22 (PID output level) =20.0%

Set P15.14=2

P15.18 (main reference level) =30.0%

P15.15 (PID output destination) = P01.27 (user programmed reference display)

P01.01 (reference source selector) = 8 (user programmed)

P01.02 (maximum frequency) = 50.00Hz

After the drive starts,

Output frequency = (P15.22×P15.14＋P15.18) ×P01.02＝(20.0%×2＋30.0%) ×50.00Hz＝35.00Hz

Example 2:

P15.14 = 2 changes for P15.14 = 4 in above example, and other parameters are unchanged. After the drive starts, output frequency＝100.0%×50.00Hz＝50.00Hz.

P15.15	PID output destination				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Run&Stop				

The destination parameter should be set up with the parameter that the PID controller is to control. Only parameters which are not protected can be controlled by the PID function. If a non-valid parameter is programmed the output is not routed anywhere.

The value of the destination parameter will automatically change according to PID output level (P15.22). There are two cases according to the type of destination parameters:

- When output destination is an integer parameter, the value of the destination parameter= the maximum of the destination parameter×P15.22
  If P15.15 selects frequency parameter,
  For example: set P15.15=4.01, then P04.01＝P01.02 (maximum frequency) ×P15.22
- When output destination is a bit parameter,
  P15.22＜100%, the value of destination parameter is 0.
  P15.22＝100%, the value of destination parameter is 1.
- When output destination is an enumeration type parameter, according to the PID output automatically correspond to destination parameter values.
  For example:
  P15.15＝1.01, the maximum of P01.01 is 8.
  Then:
  When P15.22＜12.5%, P01.01＝0
  12.5%≤P15.22＜25%, 01.01＝1
  25%≤P15.22＜37.5%, P01.01＝2
  …
  87.5%≤P15.22＜100%, P01.01＝7
  P15.22＝100%, P01.01＝8

P15.16	PID hold				
Coding	RW	US	PT	ND	PS
	■				
Range	0: off 1: on				
Default	0 (OFF)				
Change mode	Run&Stop				

The parameter is used to control the integrator. When this parameter is set to 0 the integrator operates normally. Setting this parameter to On (1) will cause the integrator value to be held as long as the PID is enabled when the drive is disabled.

NOTE:Setting this parameter does not prevent the integrator from being reset to zero if the PID controller is disabled (P15.07=0).

For example:

If the PID controller only has the integrator function (PID proportional gain P15.09=0, PID derivative gain P15.11=0).

When PID output P15.22=50%, P15.16 is set to 1. If PID enable is enabled (P15.07=1), even though P15.21 (PID error level)≠0, P15.22 holds 50%, P15.22 changes until P15.16=0. When P15.16=0, then the value of P15.22 is 0.

P15.17	**P15.12, P15.13 range**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: (P15.13) ≤ (P15.22) ≤ (P15.12) 1: - (P15.12) ≤ (P15.22) ≤ (P15.12)				
Default	0				
Change mode	Run&Stop				

If P15.17=0, PID high limit (P15.12) defines the maximum output of PID controller, and PID low limit (P15.13) defines the minimum positive or maximum negative output. If P15.17=1, then PID high limit (P15.12) defines the maximum positive and negative output.

P15.17＝0, P15.13 ≤ P15.22 ≤ P15.12

P15.17＝1, −P15.12 ≤ P15.22 ≤ P15.12

For example:

As default, set as below:

P01.01＝8 (user programmed)

P01.02＝50.00 (the maximum frequency is 50Hz)

P15.01＝4.01 (PID reference source is P04.01)

P15.02＝1.21 (PID feedback source is AI2)

P15.07＝1 (PID enabled)

P15.12＝80% (PID high limit is 80%)

P15.13＝−60% (PID low limit is −60%)

P15.15＝1.27 (PID output destination is user programmed reference)

When P15.17=0, the high limit of output frequency is 50.00Hz×80%=40.00Hz, the low limit of output frequency is 50.00Hz×(−60%)＝−30.00Hz.

When P15.17=1, the high limit of output frequency is 50.00Hz×80%＝40.00Hz, the low limit of output frequency is 50.00Hz×(−80%)＝−40.00Hz.

P15.18	**PID Main reference level**				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−100.0%～+100.0%				
Change mode	Actual				

This parameter monitors the main reference input of the PID controller. The value of P15.18 is a percentage mapping to main reference.

P15.19	PID reference level				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−100.0%～+100.0%				
Change mode	Actual				

This parameter monitors the reference input of the PID controller. The value of P15.19 is a percentage mapping to PID reference input.

P15.20	PID feedback level				
Coding		US	PT	ND	PS
			■	■	
Range	−100.0%～+100.0%				
Change mode	Actual				

This parameter monitors the feedback input of the PID controller. The value of P15.20 is a percentage mapping to PID feedback.

P15.21	PID error level				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−100.0%～+100.0%				
Change mode	Actual				

This parameter monitors the error of the PID controller.

PID error = PID reference－PID feedback

P15.22	PID output level				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−100.0%～+100.0%				
Change mode	Actual				

This parameter monitors the output of the PID controller. The value of the parameter displays as percentage. The value of the destination parameter that is selected by P15.15 (PID output destination selector) will automatically map to this percentage.

For example:

P15.22＝100%, P15.15＝4.01, the maximum frequency is 50Hz, then P04.01＝50Hz×100%＝50Hz.

The limited PID output is calculated by the following formula:

$$\text{PID output}=K_p\times e+\frac{K_i\times e}{s}+K_d\times e\times s$$

K_P＝PID proportional gain (P15.09)

K_i＝PID integral gain (P15.10)

K_d＝PID derivative (P15.11)

e＝PID error level (P15.21)

s＝Laplace operator

If the PID error level is 100%, P=1.00, then the proportional output is 100%. If the PID error level is 100%, I=1.00, then

the proportional output will increase with a 100% of linear growth per second. If the PID error increase 100% per second, D=1.00, then the derivative output is 100%.

NOTE: This parameter monitors the output of the PID controller before scaled. If P15.14≠1, then the value of destination parameter = the maximum destination parameter×P15.22×P15.14.

Comprehensive example:

Using PID controller can do the process close-loop control. The following figure is a simple application example:

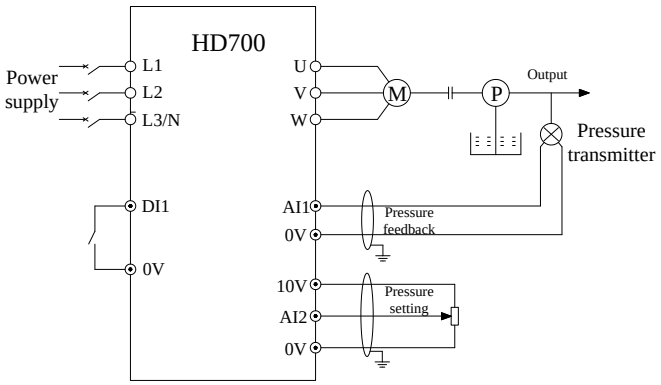


Figure 2-15-1 constant water presser control

Set:

P09.02＝3 DI1 function is run forward.

P00.04 (P01.01)＝8 Reference is user defined.

P15.15＝P01.27 PID is designated to P01.27 (user defined reference source)

P15.01＝P01.21 AI2 is PID reference source (presser reference)

P15.02＝P01.20 AI1 is PID feedback resource (presser feedback)

P15.07＝1 PID enable

P15.09 (PID proportional gain), P15.10 (PID integral gain), P15.11 (PID derivative gain) are set according to the actual situation. If these parameters respectively are set to 0, the corresponding parts are disabled.

P15.23	**Sleep mode enable**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	0				
Change mode	Stop Only				

0: Sleep mode disabled enabled

1: Sleep mode enabled

P15.24	Sleep channel selector				
Coding	RW	US	PT	ND	PS
	■	■			
Range	P00.00～P18.08				
Default	P05.11				
Change mode	Stop Only				

The parameter is used to select the sleep channel. The default parameter is output frequency.

P15.25	Sleep threshold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～P01.02 (P15.24＝P05.11) 0.0%～100.0% (P15.24＝other)				
Default	0.00Hz 0.0%				
Change mode	Stop Only				

When set P15.24 to P05.11, the absolute value of the output frequency is less than or equal to the setting value of P15.25 and it keeps over the sleep delay time (P05.26), then the drive blocks output and the keypad displays ‘007’.

When set P15.24 to other parameters, the percentage of the corresponding parameter absolute value is less than or equal to the setting percentage of P15.25 and it keeps over the sleep delay time (P05.26), then the drive blocks output and the keypad displays ‘007’.

P15.26	Sleep delay time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～3000.0s				
Default	30.0s				
Change mode	Stop Only				

P15.27	Wakeup mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	1				
Change mode	Stop Only				

P15.28	Wakeup channel selector				
Coding	RW	US	PT	ND	PS
	■	■			
Range	P00.00～P18.08				
Default	P15.20				
Change mode	Stop Only				

P15.29	Wakeup threshold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～100.0%				
Default	0.0%				
Change mode	Stop Only				

P15.30	Wakeup delay time				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s~3000.0s				
Default	0.0s				
Change mode	Stop Only				

When P15.27 = 0,the absolute value of the setup parameter of P15.28 (wakeup channel) is less than P15.29 (wakeup threshold) and it keeps over wakeup delay time (P15.30), then the drive will access wakeup mode from sleep mode and according to the previous setup parameters to run.

When P15.27 = 1,the absolute value of the setup parameter of P15.28 (wakeup channel) is more than P15.29 (wakeup threshold) and it keeps over wakeup delay time (P15.30), then the drive will access wakeup mode from sleep mode and according to the previous setup parameters to run.

P15.31	Reserved				
P15.32	Reserved				
P15.33	Reserved				
Coding	RW	US	PT	ND	PS
Range					
Default					
Change mode					

P15.34	Sleep status indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0～1				
Change mode	Actual				

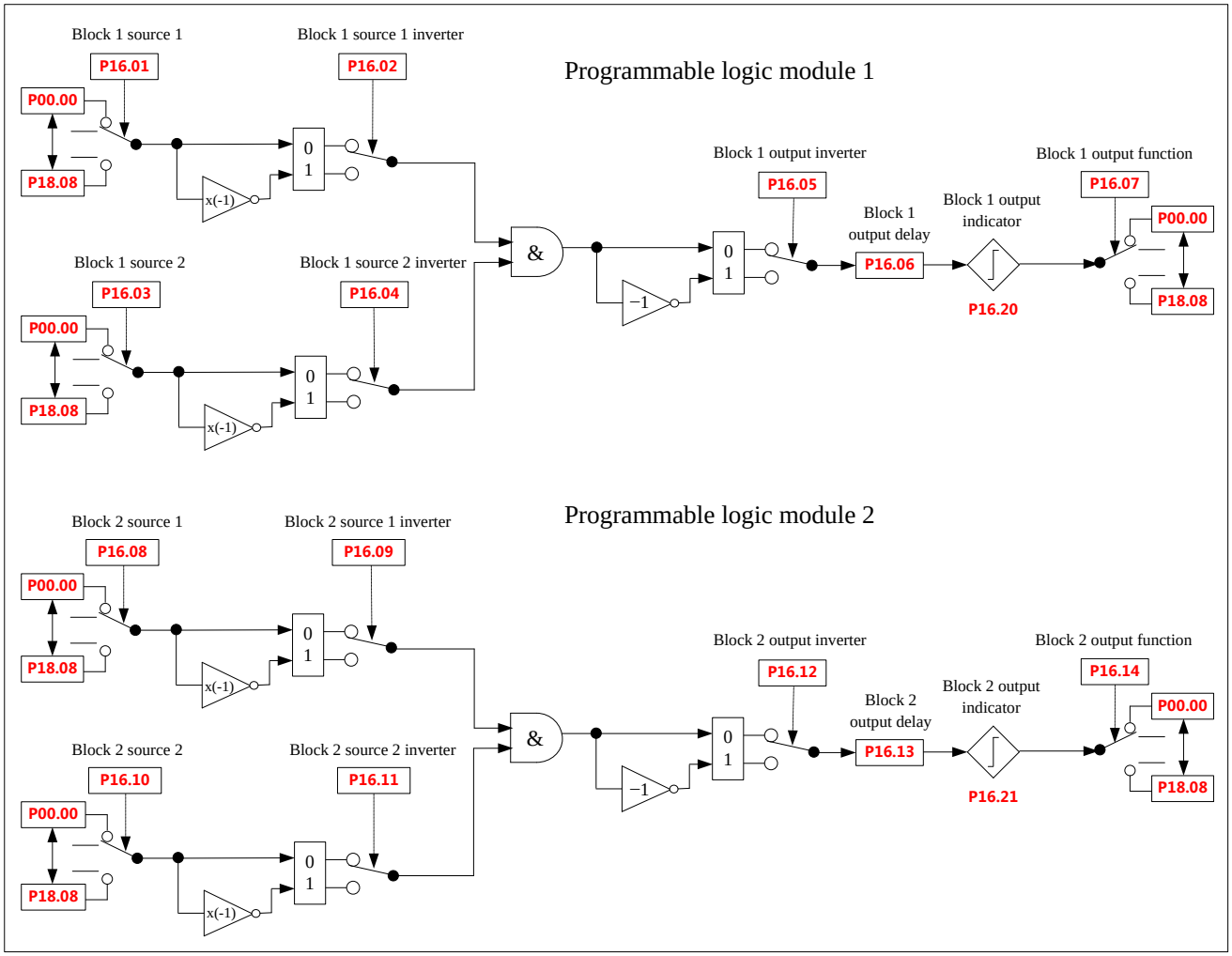
If set P15.34 to 1, it indicates that the drive is in the sleep status and the drive will alarm ‘H007’.

2.16 Menu P16: Programmable logic and binary sum

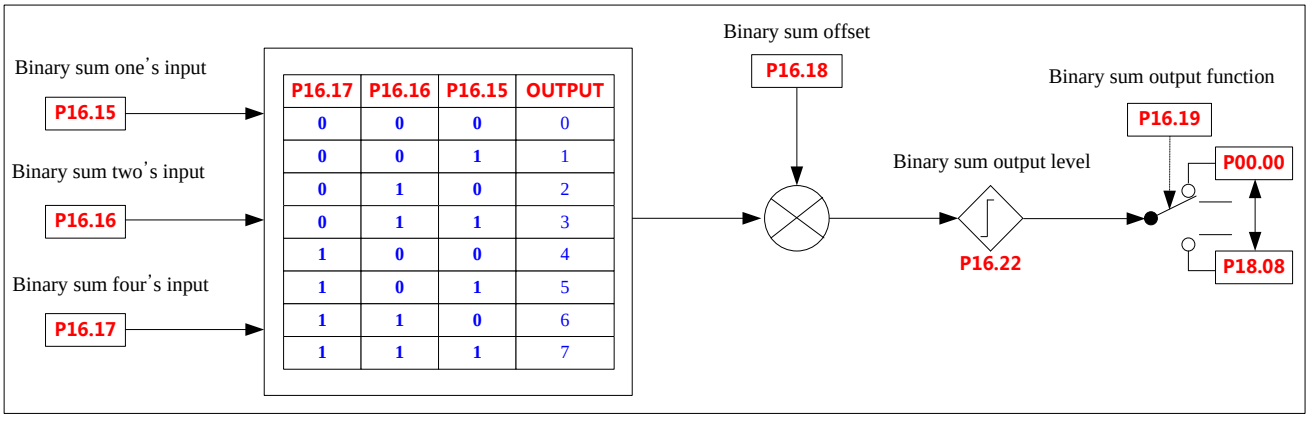
ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P16.01	Block1 source1	P00.00～P18.08	0.01	P00.00*	Stop Only	0640H
P16.02	Block1 source1 inverter	0: off 1: on	1	0	Run&Stop	0641H
P16.03	Block1 source2	P00.00～P18.08	0.01	P00.00*	Stop Only	0642H
P16.04	Block1 source2 inverter	0: off 1: on	1	0	Run&Stop	0643H
P16.05	Block1 output inverter	0: off 1: on	1	0	Run&Stop	0644H
P16.06	Block1 output delay time	−3000.0s～+3000.0s	0.1s	0.0s	Run&Stop	0645H
P16.07	Block1 output function	P00.00～P18.08	0.01	P00.00*	Stop Only	0646H
P16.08	Block2 source1	P00.00～P18.08	0.01	P00.00*	Run&Stop	0647H
P16.09	Block2 source1 inverter	0: off 1: on	1	0	Run&Stop	0648H
P16.10	Block2 source2	P00.00～P18.08	0.01	P00.00*	Stop Only	0649H
P16.11	Block2 source2 inverter	0: off 1: on	1	0	Run&Stop	064AH
P16.12	Block2 output inverter	0: off 1: on	1	0	Run&Stop	064BH
P16.13	Block2 output delay	−3000.0s～+3000.0s	0.1s	0.0	Run&Stop	064CH
P16.14	Block2 output function	P00.00～P18.08	0.01	P00.00*	Stop Only	064DH
P16.15	Binary sum one’s input	0: off 1: on	1	0	Run&Stop	064EH
P16.16	Binary sum two’s input	0: off 1: on	1	0	Run&Stop	064FH
P16.17	Binary sum four’s input	0: off 1: on	1	0	Run&Stop	0650H
P16.18	Binary sum offset	0～248	1	0	Run&Stop	0651H
P16.19	Binary sum output function	P00.00～P18.08	0.01	P00.00*	Stop Only	0652H
P16.20	Block1 output indicator	0: off 1: on	1	Actual	Actual	0653H
P16.21	Block2 output indicator	0: off 1: on	1	Actual	Actual	0654H
P16.22	Binary sum output level	0～255	1	Actual	Actual	0655H

*NOTE: There is no actual parameter P00.00. The source default is P00.00 means that the default value is not routed to any destination parameter.

Menu 16A Logic diagram



Menu 16B Logic diagram



P16.01	Block 1 source 1				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

This source parameter and P16.08 define the inputs for source 1 of the programmable logic functions. The setting range is P00.00 to P18.08. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the source parameter.

If an invalid source parameter is selected (e.g. P00.00), the input for source 1 of the programmable logic function is 0. Only bit parameters can be set for the input. If a non-bit parameter is selected as the inputs of logic module, the input for source 1 of the programmable logic function is 1 when the value of source parameter is equal or more than 50% of its maximum. The input for source 1 of the programmable logic function is 0 when the value of source parameter is less than 50% of its maximum.

For example:

- Set P16.01=1.20 (AI1 is source 1), P01.02=50 (the maximum frequency is 50Hz).
  When P1.20≥25Hz, the input 1 is “1”.
  When P01.20＜25Hz, the input is “0”.
- Set P16.01=1.01 (reference source selector is source 1)
  When P01.01≥4, the input is “1”.
  When P01.01＜4, the input is “0”.

P16.02	Block 1 source 1 inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

Setting this parameter and P16.09 to On (1) causes the input sense of the logic functions to be inverted.

P16.03	Block 1 source 2				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

This source parameter and P16.10 define the inputs for source 2 of the programmable logic functions. The setting range is P00.00 to P18.08. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the source parameter.

Please refer to the explanation of P16.01.

P16.04	Block 1 source 2 inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

Setting this parameter and P16.11 to On (1) causes the input sense of the logic functions to be inverted.

P16.05	Block 1 output inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

Setting this parameter and P16.12 to On (1) causes the output sense from the logic functions to be inverted. If the output sense is 0, P16.20=1; if the output sense is 1, P16.20=0.

P16.06	Block 1 output delay				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−3000.0s～+3000.0s				
Default	0.0				
Change mode	Run&Stop				

The parameter defines the delay time for the output sense from the logic functions changing. When the output changes, the block 1 output (P16.20) will change after the delay time .

If the delay parameter is positive, the delay ensures that the output does not become active until an active condition has been present at the input for the delay time as shown below.

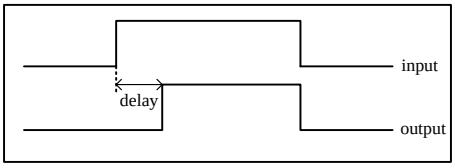


Figure 2-16-1 logic function 1 delay parameter is positive

If the delay parameter is negative, the delay holds the output active for the delay period after the active condition has been removed as shown below. Therefore, an active input that lasts for as long as the sample time or more will produce an output that lasts at least as long as the delay time.

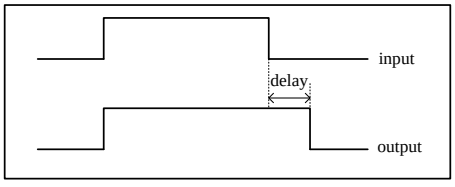


Figure 2-16-2 logic function 1 delay parameter is negative

P16.07	Block 1 output function				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

This destination parameter defines the parameters to be controlled by the logic function.

The setting range is P00.00 to P18.08. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the destination parameter. If an invalid parameter is programmed, the output is not routed anywhere. Only non-protected parameters can be programmed as a destination.

P16.08	Block 2 source 1				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Run&Stop				

This source parameter and P16.01 define the inputs for source 1 of the programmable logic functions. The setting range is P00.00 to P18.08. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the source parameter.

Please refer to the explanation of P16.01.

P16.09	Block 2 source 1 inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

Setting this parameter and P16.02 to On (1) causes the input sense of the logic functions to be inverted.

P16.10	Block 2 source 2				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

This source parameter and P16.03 defines the inputs for source 2 of the programmable logic functions. The setting range is P00.00 to P18.08. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the source parameter.

Please refer to the explanation of P16.01.

P16.11	Block 2 source 2 inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

Setting this parameter and P16.04 to On (1) causes the input sense of the logic functions to be inverted.

P16.12	Block 2 output inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

Setting this parameter and P16.05 to On (1) causes the output sense from the logic functions to be inverted.

P16.13	Block 2 output delay				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−3000.0s～+3000.0s				
Default	0.0				
Change mode	Run&Stop				

The parameter defines the delay time for the output sense from the logic functions changing.

Refer to the explanation of P16.06.

P16.14	Block 2 output function				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

This destination parameter and P16.07 define the parameters to be controlled by the logic function.

The setting range is P00.00 to P18.08. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the destination parameter. If an invalid parameter is programmed, the output is not routed anywhere. Only non-protected parameters can be programmed as a destination.

The example of logic function application (take the block 1 for example):

P16.01=5.27 (drive active)

P16.03=5.28 (rated load is on)

P16.07=1.25 (reference source is switched to AI1)

The other parameters are set as default settings.

When the drive is running (P05.27=1), if the output current reaches motor rated current (P05.28=1), block 1 output indicates P16.20=1. P01.25=1, reference source is switched to AI1 according to block 1 output.

P16.15	**Binary sum one's input**				
P16.16	**Binary sum two's input**				
P16.17	**Binary sum four's input**				
Coding	RW	US	PT	ND	PS
	■				
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

These parameters are three bits input parameters of binary – decimal conversion module. These bit inputs are processed as 3-bit binary numbers by the binary – decimal conversion module. The output results range is 0 to 7 (before P16.18 output results offset). These parameters only have two statuses: 0 or 1. When they are routed as destination parameters and the source parameter is a non-bit parameter, bit input will be 1 if the value of source parameter is equal or more than 50% of its maximum. Bit input will be 0 if the value of source parameter is less than 50% of its maximum.

For example:

Set the value of AI1 as the source parameter of P16.15.

Set:

P08.01＝1 (analogue input function is advanced application.)

P08.03＝16.15 (AI1 is the source parameter of P16.15)

The other parameters are set as default settings.

When P08.17 (AI1 level)≥50.0%, P16.15=1. When P08.17＜50.0%, P16.15=0.

Please refer to Menu 8 logic diagram and Menu P08.

P16.18	**Binary sum offset**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～248				
Default	0				
Change mode	Run&Stop				

The parameter is used to make binary output results range larger. The value of this parameter is an integer between 0 and 248.

P16.19	Sum output function				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

This destination parameter defines the parameters to be controlled by the binary – decimal conversion logic function. It is used to route the output to destination parameters.

Only non-protected parameters can be programmed as a destination.

P16.20	Block 1 output indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0: off 1: on				
Change mode	Actual				

P16.21	Block 2 output indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0: off 1: on				
Change mode	Actual				

The two parameters respectively indicate the outputs status of programmable logic functions.

P16.22	Sum output level				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0～255				
Change mode	Actual				

The parameter is used to display the binary sum output. The binary sum output is given by:

$P16.22 = P16.17 \times 2^2 + P16.16 \times 2^1 + P16.15 \times 2^0 + P16.18$

The value written to the destination parameter is defined as follows:

If maximum of the destination parameter is ≤ (7 + P16.18):

The value in the destination parameter = the binary sum output (P16.22), if the binary sum output < the maximum of the destination parameter.

The value in the destination parameter = the maximum of the destination parameter, if the binary sum output > the maximum of the destination parameter.

If maximum of the destination parameter > (7 + P16.18):

The value in the destination parameter =

the maximum of the destination parameter×the binary sum output (P16.22)/(7+P16.18)

The table below shows how the binary sum function operates with 0 offset (P16.18=0).

Table 2-16-1 The binary sum function operates with 0 offset (P16.18=0)

Four's input (P16.17)	Two's input (P16.16)	One's input (P16.15)	Binary sum output (P16.22)	Value in destination parameter	
				Destination parameter with a maximum value of 7 or less, i.e. P03.05 with a range of 0 to 4	Destination parameter with a maximum value of greater than 7, i.e. P10.05 with a range of 0 to 250
0	0	0	0	0	0
0	0	1	1	1	35
0	1	0	2	2	71
0	1	1	3	3	107
1	0	0	4	4	143
1	0	1	5	4	178
1	1	0	6	4	214
1	1	1	7	4	250

The table below shows how the binary sum function operates with an offset value (e.g. P16.18=3).

Table 2-16-2 The binary sum function operates with an offset value (e.g. P16.18=3)

Four's input (P16.17)	Two's input (P16.16)	One's input (P16.15)	Binary sum offset (P16.18)	Binary sum output (P16.22)	Value in destination parameter	
					Destination parameter with a maximum value of (7 + offset) or less, i.e. P01.01 with a range of 0 to 8	Destination parameter with a maximum value of greater than 7, i.e. P10.05 with a range of 0 to 250
0	0	0	3	3	3	75
0	0	1		4	4	100
0	1	0		5	5	125
0	1	1		6	6	150
1	0	0		7	7	175
1	0	1		8	8	200
1	1	0		9	8	225
1	1	1		10	8	250

2.17 Menu P17: Programmable threshold and variable selector

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P17.01	Threshold block1 source	P00.00～P18.08	0.01	P00.00*	Stop Only	06A4H
P17.02	Threshold block1 threshold	0.0%～100.0%	0.1%	0.0	Run&Stop	06A5H
P17.03	Threshold block1 hysteresis	0.0%～25.0%	0.1%	0.0	Run&Stop	06A6H
P17.04	Threshold block1 output inverter	0: off 1: on	1	0	Run&Stop	06A7H
P17.05	Threshold block1 output function	P00.00～P18.08	0.01	P00.00*	Stop Only	06A8H
P17.06	Threshold block2 source	P00.00～P18.08	0.01	P00.00*	Stop Only	06A9H
P17.07	Threshold block2 threshold	0.0%～100.0%	0.1%	0.0	Run&Stop	06AAH
P17.08	Threshold block2 hysteresis	0.0%～25.0%	0.1%	0.0	Run&Stop	06ABH
P17.09	Threshold block2 output inverter	0: off 1: on	1	0	Run&Stop	06ACH
P17.10	Threshold block2 output function	P00.00～P18.08	0.01	P00.00*	Stop Only	06ADH
P17.11	Variable selector1 source1	P00.00～P18.08	0.01	P00.00*	Stop Only	06AEH
P17.12	Variable selector1 source2	P00.00～P18.08	0.01	P00.00*	Stop Only	06AFH
P17.13	Variable selector1 source1 scaling	−4.000～+4.000	0.001	1.000	Run&Stop	06B0H
P17.14	Variable selector1 source2 scaling	−4.000～+4.000	0.001	1.000	Run&Stop	06B1H
P17.15	Variable selector1 mode	0～9	1	0	Stop Only	06B2H

P17.15	Action	Result	
0	Select input 1	output=input1	
1	Select input 2	output=input2	
2	Add	output=input1+ input2	
3	Subtract	output=input1−input2	
4	Multiply	output= (input1×input2)/100	
5	Divide	output= (input1×100)/ input2	
6	Time constant	output=input1/[(P17.16)s+1]	
7	Linear ramp	output=Input1 ramp up from 0%～100% in time of (P17.16)	
8	Modulus	output=|input1|	
9	Raise to power	P17.16＝0.02	output=$(input1)^2/100$
		P17.16＝0.03	output=$(input1)^3/100^2$
		P17.16 has any other value	output=input1

Note: (P17.16) means the value of P17.16.

P17.16	Variable selector1 control factor	0.00～99.99	0.01	0.00	Run&Stop	06B3H
P17.17	Variable Selector1 output function	P00.00～P18.08	0.01	P00.00*	Stop Only	06B4H
P17.18	Variable selector2 source1	P00.00～P18.08	0.01	P00.00*	Stop Only	06B5H
P17.19	Variable selector2 source2	P00.00～P18.08	0.01	P00.00*	Stop Only	06B6H
P17.20	Variable selector2 source1 scaling	−4.000～+4.000	0.001	1.000	Run&Stop	06B7H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P17.21	Variable selector2 source2 scaling	−4.000～+4.000	0.001	1.000	Run&Stop	06B8H
P17.22	Variable selector2 mode	0～9	1	0	Stop Only	06B9H

P17.22	Action	Result	
0	Select input 1	output=input1	
1	Select input 2	output=input2	
2	Add	output=input1+ input2	
3	Subtract	output=input1−input2	
4	Multiply	output= (input1×input2)/100	
5	Divide	output= (input1×100)/ input2	
6	Time constant	output=input1/[(P17.23)s+1]	
7	Linear ramp	output=Input1 ramp up from 0%～100% in time of (P17.23)	
8	Modulus	output=|input1|	
9	Raise to power	P17.23=0.02	output=$(input1)^2/100$
		P17.23=0.03	output=$(input1)^3/100^2$
		P17.23 has any other value	output=input1

Note: (P17.23) means the value of P17.23.

P17.23	Variable selector2 control factor	0.00～99.99	0.01	0.00	Run&Stop	06BAH
P17.24	Variable Selector2 output function	P00.00～P18.08	0.01	P00.00*	Stop Only	06BBH
P17.25	Variable selector3 source1	P00.00～P18.08	0.01	P00.00*	Stop Only	06BCH
P17.26	Variable selector3 source2	P00.00～P18.08	0.01	P00.00*	Stop Only	06BDH
P17.27	Variable selector3 source1 scaling	−4.000～+4.000	0.001	1.000	Run&Stop	06BEH
P17.28	Variable selector3 source2 scaling	−4.000～+4.000	0.001	1.000	Run&Stop	06BFH
P17.29	Variable selector3 mode	0～9	1	0	Stop Only	06C0H

P17.29	Action	Result	
0	Select input 1	output=input1	
1	Select input 2	output=input2	
2	Add	output=input1+ input2	
3	Subtract	output=input1−input2	
4	Multiply	output= (input1×input2)/100	
5	Divide	output= (input1×100)/ input2	
6	Time constant	output=input1/[(P17.30)s+1]	
7	Linear ramp	output=Input1 ramp up from 0%～100% in time of (P17.30)	
8	Modulus	output=|input1|	
9	Raise to power	P17.30=0.02	output=$(input1)^2/100$
		P17.30=0.03	output=$(input1)^3/100^2$
		P17.16 has any other value	output=input1

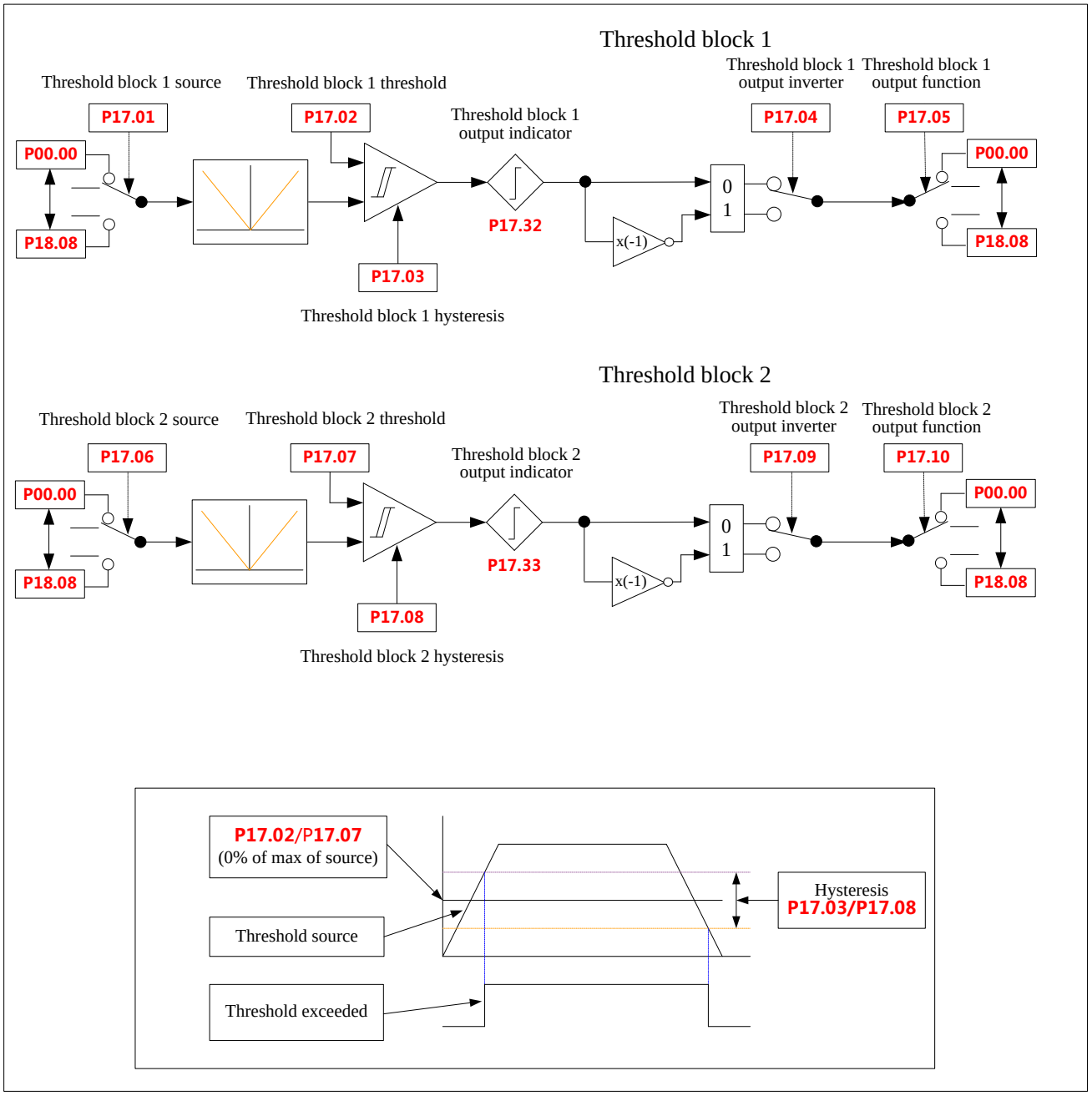
Note: (P17.30) means the value of P17.30.

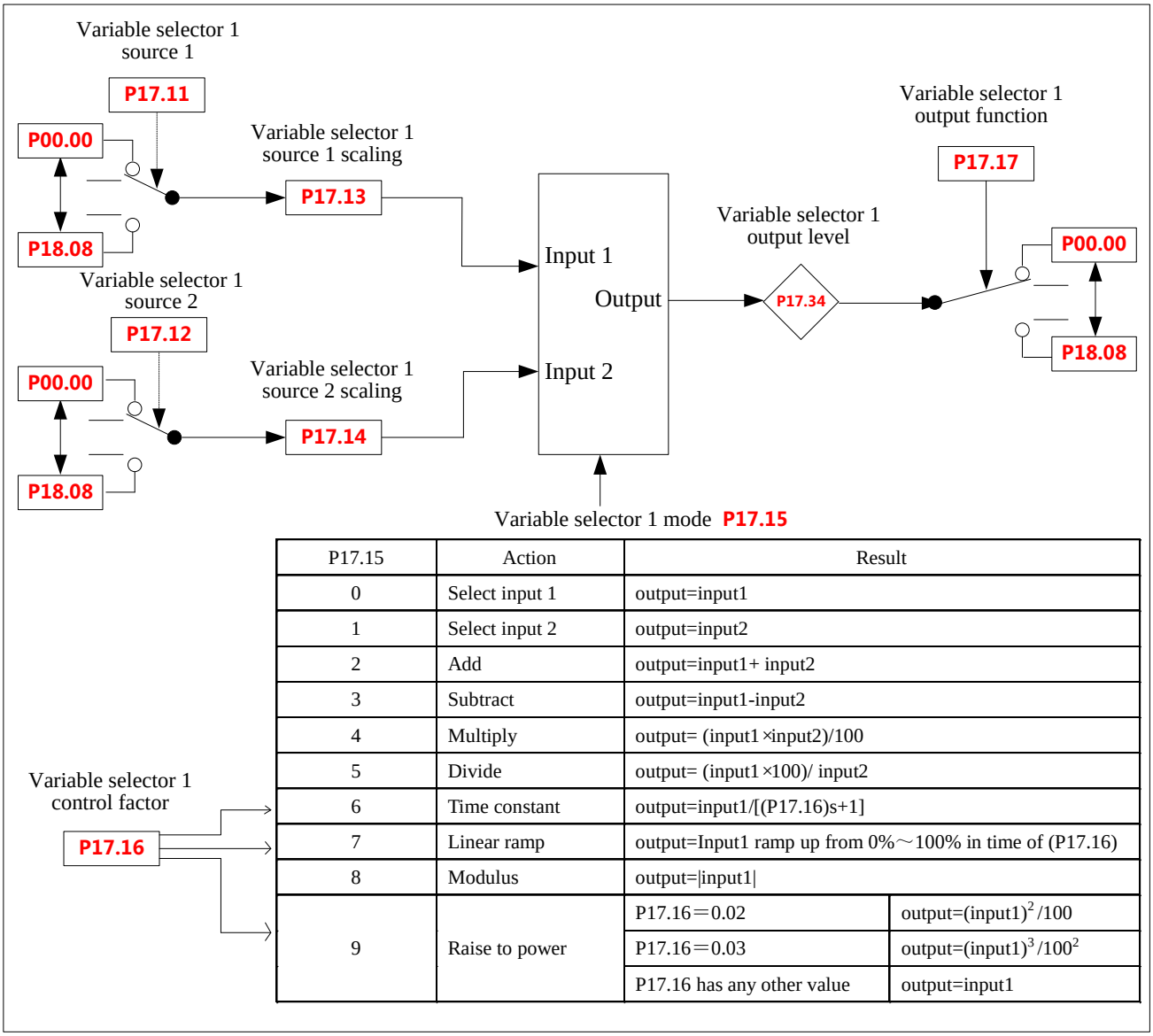
P17.30	Variable selector3 control factor	0.00～99.99	0.01	0.00	Run&Stop	06C1H

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P17.31	Variable Selector3 output function	P00.00～P18.08	0.01	P00.00*	Stop Only	06C2H
P17.32	Threshold block1 output indicator	0, 1	1	Actual	Actual	06C3H
P17.33	Threshold block2 output indicator	0, 1	1	Actual	Actual	06C4H
P17.34	Variable selector1 output level	−100.0%～+100.0%	0.1%	Actual	Actual	06C5H
P17.35	Variable selector2 output level	−100.0%～+100.0%	0.1%	Actual	Actual	06C6H
P17.36	Variable selector3 output level	−100.0%～+100.0%	0.1%	Actual	Actual	06C7H
P17.37	User-defined bit variable 1	0～1	1	0	Run&Stop	06C8H
P17.38	User-defined bit variable 2	0～1	1	0	Run&Stop	06C9H
P17.39	User-defined bit variable 3	0～1	1	0	Run&Stop	06CAH
P17.40	User-defined bit variable 4	0～1	1	0	Run&Stop	06CBH
P17.41	User-defined bit variable 5	0～1	1	0	Run&Stop	06CCH
P17.42	User-defined word variable 1	−300.0%～300.0%	0.1%	0.0%	Run&Stop	06CDH
P17.43	User-defined word variable 2	−300.0%～300.0%	0.1%	0.0%	Run&Stop	06CEH
P17.44	User-defined word variable 3	−300.0%～300.0%	0.1%	0.0%	Run&Stop	06CFH
P17.45	User-defined word variable 4	−300.0%～300.0%	0.1%	0.0%	Run&Stop	06D0H
P17.46	User-defined word variable 5	−300.0%～300.0%	0.1%	0.0%	Run&Stop	06D1H

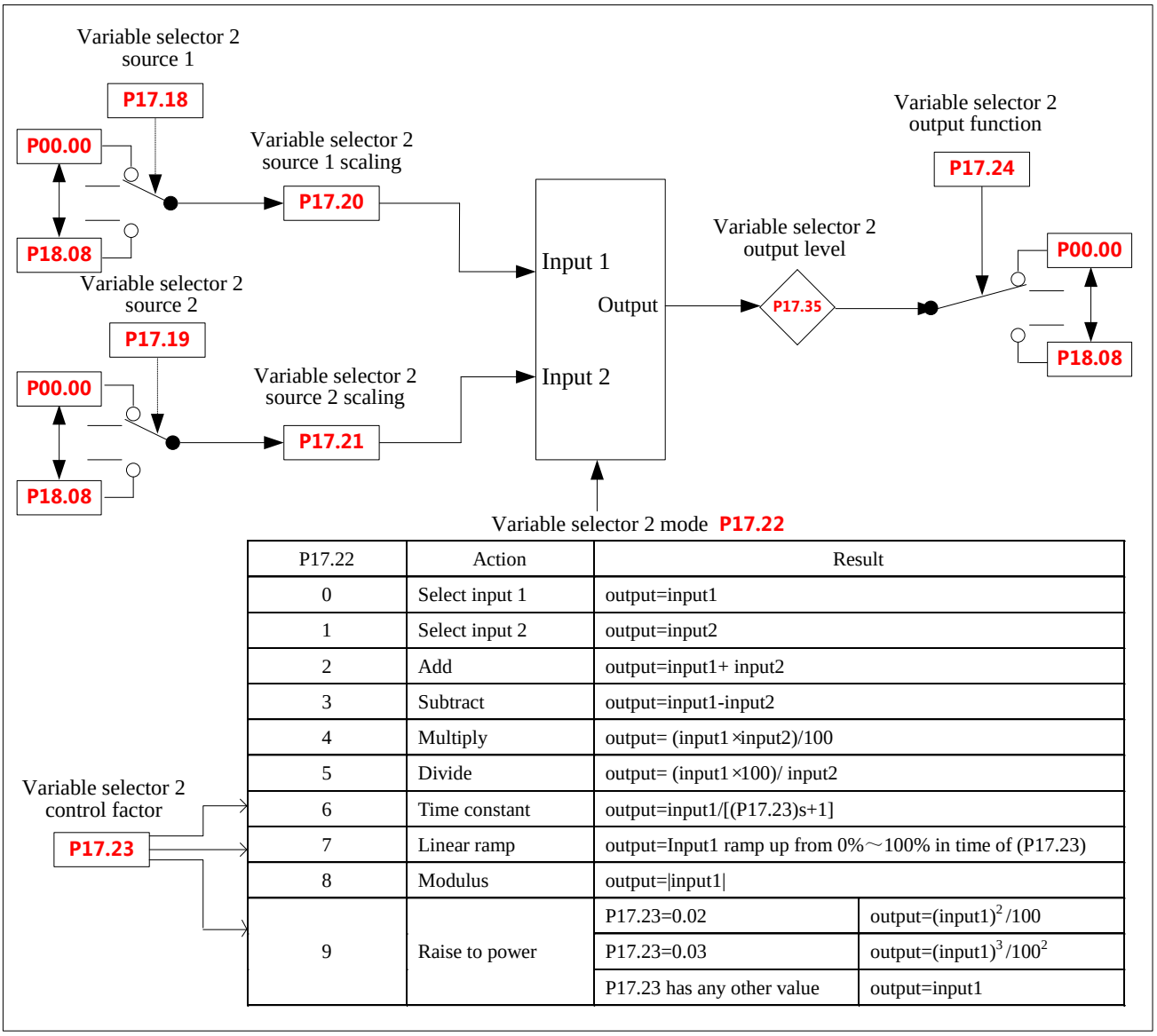
*NOTE: There is no actual parameter P00.00. The source default is P00.00 means that the default value is not routed to any destination parameter.

Menu 17 Logic diagram



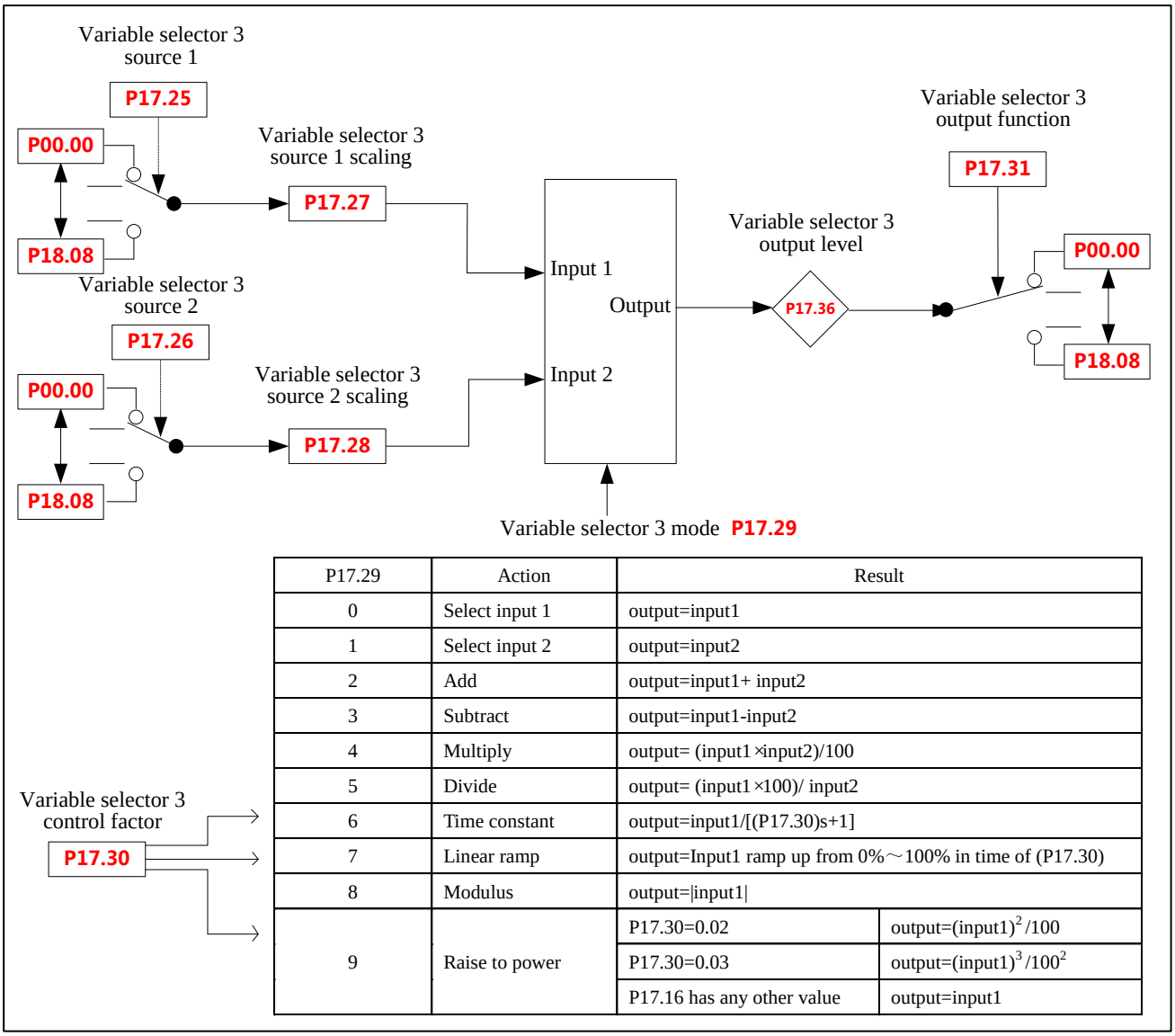


P17.15	Action	Result	
0	Select input 1	output=input1	
1	Select input 2	output=input2	
2	Add	output=input1+ input2	
3	Subtract	output=input1-input2	
4	Multiply	output= (input1 ×input2)/100	
5	Divide	output= (input1 ×100)/ input2	
6	Time constant	output=input1/[(P17.16)s+1]	
7	Linear ramp	output=Input1 ramp up from 0%～100% in time of (P17.16)	
8	Modulus	output=|input1|	
9	Raise to power	P17.16＝0.02	output=$(input1)^2/100$
		P17.16＝0.03	output=$(input1)^3/100^2$
		P17.16 has any other value	output=input1



P17.22	Action	Result	
0	Select input 1	output=input1	
1	Select input 2	output=input2	
2	Add	output=input1+ input2	
3	Subtract	output=input1-input2	
4	Multiply	output= (input1 ×input2)/100	
5	Divide	output= (input1 ×100)/ input2	
6	Time constant	output=input1/[(P17.23)s+1]	
7	Linear ramp	output=Input1 ramp up from 0%～100% in time of (P17.23)	
8	Modulus	output=|input1|	
9	Raise to power	P17.23=0.02	output=$(input1)^2/100$
		P17.23=0.03	output=$(input1)^3/100^2$
		P17.23 has any other value	output=input1

Variable selector 2 control factor
P17.23



P17.29	Action	Result	
0	Select input 1	output=input1	
1	Select input 2	output=input2	
2	Add	output=input1+ input2	
3	Subtract	output=input1-input2	
4	Multiply	output= (input1 ×input2)/100	
5	Divide	output= (input1 ×100)/ input2	
6	Time constant	output=input1/[(P17.30)s+1]	
7	Linear ramp	output=Input1 ramp up from 0%～100% in time of (P17.30)	
8	Modulus	output=|input1|	
9	Raise to power	P17.30=0.02	output=$(input1)^2/100$
		P17.30=0.03	output=$(input1)^3/100^2$
		P17.16 has any other value	output=input1

P17.01	Threshold block 1 source				
Coding	RW	US	PT	ND	PS
	■		■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

This parameter and P17.06 define the parameter to be input to the programmable threshold. The setting range is P00.00 to P18.08. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the source parameter.

The absolute value of the source variable is taken as input to the threshold comparator. The input to the threshold comparator automatically is transformed into a percentage of maximum of the source parameter. If a non-valid parameter (e.g. P00.00) is programmed the input value is taken as 0.

Refer to the explanation of P17.05.

P17.02	Threshold block 1 threshold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～100.0%				
Default	0.0				
Change mode	Run&Stop				

This parameter and P17.07 are the user defined threshold levels entered as a percentage of the source maximum.

For example:

If P17.01=1.20, the threshold level is a percentage of P01.02 maximum.

If P17.01=1.01 and P01.01 range is 0 to 8, the threshold level is a percentage of 8.

Refer to the explanation of P17.05.

P17.03	Threshold block 1 hysteresis				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～25.0%				
Default	0.0				
Change mode	Run&Stop				

This parameter and P17.08 define the band within which no change will occur on the output. The value of P17.03 is displayed as a percentage of the source maximum.

The upper limit for switching is: Threshold Level + Hysteresis/2

The lower limit for switching is: Threshold Level - Hysteresis/2

Refer to the explanation of P17.05.

P17.04	Threshold block 1 output inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

This parameter and P17.09 are used to invert the logic states of the threshold output if required.

Refer to the explanation of P17.05.

P17.05	Threshold block 1 output function				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

This parameter and P17.10 define the parameter which is to be controlled by the threshold parameter. The setting range is P00.00 to P18.08. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the destination parameter.

Only parameters which are not protected can be set up as a destination. If a non-valid parameter is programmed the output is not routed anywhere.

Threshold application example:

When the drive is accelerating, if the output frequency is less than 30.00 Hz, auto energy saving control is enabled (P06.11=1). When the drive is decelerating, if the output frequency is less than 20.00Hz, auto energy saving control is enabled (P06.11=1). Other cases, auto energy saving control is disabled. Make the following parameters settings:

P01.02＝50.00Hz (the maximum frequency is 50.00Hz)

P17.01＝5.11 (the input parameter is output frequency)

P17.02＝50% (threshold is 50%, hysteresis center is 25.00Hz)

P17.03＝20% (hysteresis is 20%, the upper limit for switching is30.00Hz. The lower limit for switching is20.00Hz)

P17.04＝1 (threshold block 1 output inverter)

P17.05＝6.11 (output destination is “auto energy saving control”)

Threshold output as the following figure:

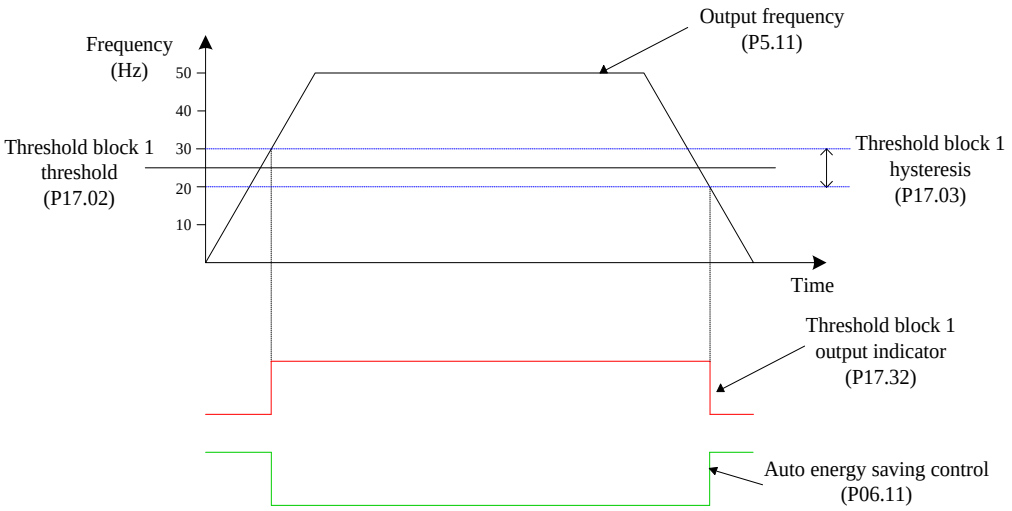


Figure 2-17-1 Threshold running diagram

P17.06	Threshold block 2 source				
Coding	RW	US	PT	ND	PS
	■		■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Run&Stop				

This parameter and P17.01 define the parameter to be input to the programmable threshold.

Refer to the explanation of P17.01.

P17.07	Threshold block 2 threshold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～100.0%				
Default	0.0				
Change mode	Run&Stop				

This parameter and P17.02 are the user defined threshold levels entered as a percentage of the source maximum.

Refer to the explanation of P17.02.

P17.08	Threshold block 2 hysteresis				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0%～25.0%				
Default	0.0				
Change mode	Run&Stop				

This parameter and P17.03 define the band within which no change will occur on the output.

Refer to the explanation of P17.03.

P17.09	Threshold block 2 output inverter				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Run&Stop				

This parameter and P17.04 are used to invert the logic states of the threshold output if required.

Refer to the explanation of P17.04.

P17.10	Threshold block 2 output function				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Run&Stop				

This parameter and P17.05 define the parameter which is to be controlled by the threshold parameter. The setting range is P00.00 to P18.08. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the destination parameter.

Refer to the explanation of P17.05.

P17.11	Variable selector 1 source 1				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

P17.12	Variable selector 1 source 2				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

These parameters define the parameters which are to be switched by the variable selector block. The setting range is P00.00 to P18.08. There is no actual parameter P00.00. P00.00 means that no parameter is selected as the source parameter.

The source parameters can be bit variables or non bit variables. If programming a reference to a variable source select, if the reference is a whole number, then the variable source treats the whole number as a percentage, e.g. set P01.02=50.00Hz (the maximum frequency is 50.00Hz), P17.11=P04.01 (the source parameter of Variable selector 1 source 1 is P04.01, the default is 5.00Hz), then 5.0Hz = 10% of reference.

P17.13	Variable selector 1 source 1 scaling				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−4.000～+4.000				
Default	1.000				
Change mode	Run&Stop				

The parameter can be used to scale the source 1 input of the variable selector 1.

P17.14	Variable selector 1 source 2 scaling				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−4.000～+4.000				
Default	1.000				
Change mode	Run&Stop				

The parameter can be used to scale the source 2 input of the variable selector 1.

P17.15	Variable selector 1 mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～9				
Default	0				
Change mode	Stop Only				

The output of the variable select can be changed by the mode as in the following table:

Table 2-17-1 Variable selector 1 mode

Mode value (P17.15)	Action	Result
0	Select input 1	output=input1
1	Select input 2	output=input2
2	Add	output=input1+ input2
3	Subtract	output=input1−input2
4	Multiply	output= (input1×input2)/100
5	Divide	output= (input1×100)/ input2
6	Time constant	output=input1/[(P17.16)s+1]
7	Linear ramp	output=Input1 ramp up from 0%～100% in time of (P17.16)
8	Modulus	output=|input1|
9	Raise to power	P17.16＝0.02: output=$(input1)^2/100$
		P17.16＝0.03: output=$(input1)^3/100^2$
		P17.16 has any other value: output=input1

P17.05=0, output=input 1:

For example:

P17.11＝4.01, P17.12＝4.02, P17.15＝0, P17.17 (variable selector 1 output function)=4.03, then the value of P04.03 will change according to the value of P04.01 and keep the same with the value of P04.01, i.e. P04.03＝P04.01.

P17.15=1, output=input 2:

Input 2 is selected as variable selector 1 output.

The example above, P04.03＝P04.02.

P17.15=2, output= input1+ input2:

In the example above, if P04.01＝5Hz, P04.02＝10Hz, the maximum frequency is 50Hz,

then P04.03＝ (10%+20%)×50＝15Hz.

P17.15=3, output= input1− input2:

For example:

P17.11＝4.01, P17.12＝4.02, P17.15＝3, P17.17＝4.03, P04.01＝5Hz, P04.02＝10Hz, the maximum frequency is 50Hz.

Then P04.03＝ (10%−20%)×50＝−5Hz.

P17.15＝4, multiply: Output= (input1×input2)/100

P17.15＝5, divide: Output= (input1×100)/ input2

Because variables are taken as percentages in operation, input 1 and input 2 in formulas above are percentages of the source maximum omitting “%”. The result is displayed as percentage in P17.34, and the value of P17.34 omits “%” too.

For example:

Multiplication:

P01.02＝50.00 (the maximum frequency is 50.00Hz)

P17.11＝4.16 (variable selector 1 source 1 is P04.06)

P4.16＝50.00 (P04.16 is set to 50.00Hz)

P17.12＝8.17 (variable selector 1 source 2 is AI1 level)

P08.17＝50.0 (P08.17 value range is 0 to 100%. P08.17 is set to 50%.)

P17.15＝4 (multiplication)

P17.17＝4.01 (destination parameter for the variable selector 1 output is P04.01)

Then: in multiply operation, input 1=100%, and input 2=50%

output= (input1×input2)/100.0=(100.0×50.0)/100.0＝50.0

P17.34 displays 50.0

Destination parameter P04.01＝50.00Hz×50.0%＝25.00Hz

Division:

P01.02＝50.00 (the maximum frequency is 50.00Hz)

P17.11＝4.03 (variable selector 1 source 1 is P04.03)

P4.03＝20.00 (P04.03 is set to 20.00Hz)

P17.12＝4.05 (variable selector 1 source 2 is P04.05)

P04.05＝40.00 (P04.05 is set to 40.00Hz)

P17.15＝5 (division)

P17.17＝4.01 (destination parameter for the variable selector 1 output is P04.01)

Then: in division operation, input 1=40%, and input 2=80%

Output=(40.0×100.0)/80.0＝50.0

P17.34 displays 50.0

Destination parameter P04.01＝50.00Hz×50.0%＝25.00Hz

P17.15=6, variable selector 1 is similar to the first order filter with a time constant of P17.16. P17.16 value range is 0.01s to 99.9s.

P17.15＝7

If input 1changes from 0 to 100.0%, the output linear ramps from 0.0% to 100.0% in time P17.16 set.

P17.15＝8, modulus

output=|input1|

P17.15=9, raise to power

When control parameter P17.16=0.02, output=$(input1)^2/100$

For example:

P17.11＝4.01 (variable selector 1 source 1 is preset 1), P01.02＝50.00Hz (the maximum frequency is 50.00Hz), P04.01=5.00Hz (input 1 is 10.0%), P17.15＝9, P17.16＝0.02, output=$(10.0)^2/100$＝1.0, means 1.0% (the keypad do not display "%").

When control parameter P17.16=0.03, output=$(input1)^3/100^2$

The example above, reset P17.16=0.03, output=$(10.0)^3/100^2$＝0.1, means 0.1% (the keypad do not display "%").

When P17.16 is set to any other value, output=input 1

NOTE:

P17.16 is a control parameter, and the meaning of P17.16 changes according to P17.15.

- P17.15=6, P17.16 is a time constant of the first order filter.
- P17.15=7, P17.16 is the time that output increases from 0 to 100% when input 1 changes from 0 to 100.0%.
- P17.15=9, the value of P17.16 determines that variable selector 1 output is one power, twice power or three power of input 1.

P17.16	**Variable selector 1 control factor**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00～99.99				
Default	0.00				
Change mode	Run&Stop				

The control parameter can be used to input a value when modes 6, 7 and 9 of the variable selector 1 are implemented. Refer to P17.15 for details.

P17.17	**Variable selector 1 output function**				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

Defines the destination parameter for the variable selector 1 output. Only non-protected parameters can be programmed as a destination. If a invalid parameter is programmed, the output is not routed anywhere.

For example:

Set:

P17.11＝1.20 (AI1 reference is selected as variable selector 1 input 1)

P17.12＝1.21 (AI2 reference is selected as variable selector 1 input 2)

P17.15＝2 (operation mode is addition)

P01.02＝50.00Hz (the maximum frequency is 50.00Hz)

P17.17＝1.27 (variable selector 1 output is connected to user defined)

P01.01＝8 (reference source is user defined)

If P1.20＝20.00Hz, P1.21＝15.00Hz, then P17.34＝(20.00/50.00)+(15.00/50.00)＝70 (%)

P1.27＝50.00×70 (%)＝35.00Hz

The drive output frequency is 35.00Hz.

NOTE:

- The value of the destination parameter=the maximum of the destination parameter×variable selector 1 output level (P17.34)
- When the destination parameter is a integral type parameter, the value of the destination parameter is a percentage of variable selector 1 output.
- When the destination parameter is an enumeration type parameter, the number of the value the destination parameter behind the decimal point will be omitted.

  For example:

  If P17.17=P01.01, P17.34＝30%, then P01.01＝8×30%＝2.4, so the actual result is P01.01＝2.
- When the destination parameter is a bit parameter, the value of the destination parameter is 1 if variable selector 1 output is equal to or more than 50%. Otherwise, the value is 0.

P17.18	**Variable selector 2 source 1**				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

P17.19	**Variable selector 2 source 2**				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P 00.00				
Change mode	Stop Only				

These parameters define the parameters which are to be switched by the variable selector block. These can be bit variables or non bit variables. If programming a reference to a variable source select, if the reference is a whole number, then the variable source treats the whole number as a percentage, e.g. 5.0Hz = 10% of reference.

Please refer to the explanation of P17.11 and P17.12.

P17.20	**Variable selector 2 source 1 scaling**				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−4.000～+4.000				
Default	1.000				
Change mode	Run&Stop				

The parameter can be used to scale the source 1 input of the variable selector 2.

P17.21	Variable selector 2 source 2 scaling				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−4.000～+4.000				
Default	1.000				
Change mode	Run&Stop				

The parameter can be used to scale the source 2 input of the variable selector 2.

P17.22	Variable selector 2 mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～9				
Default	0				
Change mode	Stop Only				

The output of the variable select can be changed by the mode as in the following table:

Table 2-17-2 Variable selector 2 mode

Mode value (P17.22)	Action	Result
0	Select input 1	output=input1
1	Select input 2	output=input2
2	Add	output=input1+ input2
3	Subtract	output=input1−input2
4	Multiply	output= (input1×input2)/100
5	Divide	output= (input1×100)/input2
6	Time constant	output=input1/[(P17.23)s+1]
7	Linear ramp	output=Input1 ramp up from 0%～100% in time of (P17.23)
8	Modulus	output=|input1|
9	Raise to power	P17.23=0.02: output=$(input1)^2$ /100
		P17.23=0.03: output=$(input1)^3$ /100^2
		P17.23 has any other value: output=input1

Refer to the explanation of P17.15.

P17.23	Variable selector 2 control factor				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00～99.99				
Default	0.00				
Change mode	Run&Stop				

The control parameter can be used to input a value when modes 6, 7 and 9 of the variable selector are implemented.

Refer to P17.16 for details.

P17.24	Variable selector 2 output function				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

Defines the destination parameter for the variable selector 2 output. Only non-protected parameters can be programmed as a destination. If a invalid parameter is programmed, the output is not routed anywhere.

Refer to the explanation of P17.17.

P17.25	Variable selector 3 source 1				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

P17.26	Variable selector 3 source 2				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P 00.00				
Change mode	Stop Only				

These parameters define the parameters which are to be switched by the variable selector block. These can be bit variables or non bit variables. If programming a reference to a variable source select, if the reference is a whole number, then the variable source treats the whole number as a percentage, e.g. 5.0Hz = 10% of reference.

Refer to the explanation of P17.11 and P17.12.

P17.27	Variable selector 3 source 1 scaling				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−4.000～+4.000				
Default	1.000				
Change mode	Run&Stop				

The parameter can be used to scale the source 1 input of the variable selector.

P17.28	Variable selector 3 source 2 scaling				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−4.000～+4.000				
Default	1.000				
Change mode	Run&Stop				

The parameter can be used to scale the source 2 input of the variable selector.

P17.29	Variable selector 3 mode				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～9				
Default	0				
Change mode	Stop Only				

The output of the variable select can be changed by the mode as in the following table:

Table 2-17-3 variable selector 3 mode

Mode value (P17.29)	Action	Result
0	Select input 1	output=input1
1	Select input 2	output=input2
2	Add	output=input1+ input2
3	Subtract	output=input1−input2
4	Multiply	output= (input1×input2)/100
5	Divide	output= (input1×100)/ input2
6	Time constant	output=input1/[(P17.30)s+1]
7	Linear ramp	output=Input1 ramp up from 0%～100% in time of (P17.30)
8	Modulus	output=|input1|
9	Raise to power	P17.30=0.02: output=$(input1)^2$ /100
		P17.30=0.03: output=$(input1)^3$ /100^2
		P17.30 has any other value: output=input 1

Refer to the explanation of P17.15.

P17.30	Variable selector 3 control factor				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00～99.99				
Default	0.00				
Change mode	Run&Stop				

The control parameter can be used to input a value when modes 6, 7 and 9 of the variable selector are implemented.

Refer to the explanation of P17.16.

P17.31	Variable selector 3 output control				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	P00.00～P18.08				
Default	P00.00				
Change mode	Stop Only				

Defines the destination parameter for the variable selector 3 output. Only non-protected parameters can be programmed as a destination. If a invalid parameter is programmed, the output is not routed anywhere.

Refer to the explanation of P17.17.

P17.32	Threshold block 1 output indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0, 1				
Change mode	Actual				

P17.33	Threshold block 2 output indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0, 1				
Change mode	Actual				

These parameters indicate whether the threshold input variable is above (On) or below (OFF) the programmed threshold.

If the threshold input variable is above Threshold Level + Hysteresis/2, the keypad displays 1.

If the threshold input variable is below Threshold Level − Hysteresis/2, the keypad displays 0.

Refer to the explanation of P17.15.

P17.34	Variable selector 1 output level				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−100.0%～+100.0%				
Change mode	Actual				

P17.35	Variable selector 2 output level				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−100.0%～+100.0%				
Change mode	Actual				

P17.36	Variable selector 3 output level				
Coding	RW	US	PT	ND	PS
			■	■	
Range	−100.0%～+100.0%				
Change mode	Actual				

These parameters indicate the level of output signal from the variable selectors. They are displayed as percentage.

Refer to the explanation of P17.17.

P17.37	User-defined bit variable 1				
P17.38	User-defined bit variable 2				
P17.39	User-defined bit variable 3				
P17.40	User-defined bit variable 4				
P17.41	User-defined bit variable 5				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0～1				
Default	0				
Change mode	Run&Stop				

Parameters P17.37 to P17.41 are user-defined bit variables that are no specific meanings. These parameters can be selected as destination parameters by any programmable parameters and the user can define these parameters' meanings.

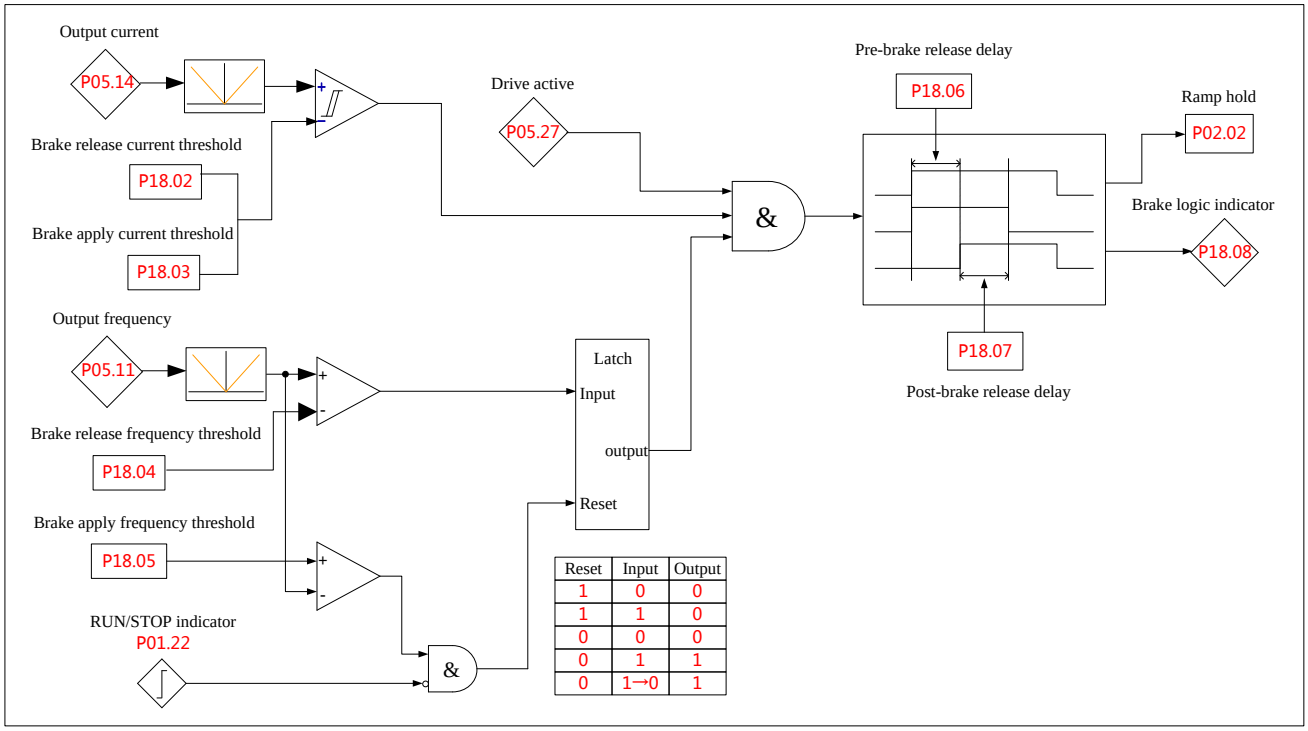
P17.42	User-defined word variable 1				
P17.43	User-defined word variable 2				
P17.44	User-defined word variable 3				
P17.45	User-defined word variable 4				
P17.46	User-defined word variable 5				
Coding	RW	US	PT	ND	PS
	■	■			
Range	−300.0%～300.0%				
Default	0.0%				
Change mode	Run&Stop				

Parameters P17.42 to P17.46 are user-defined word variables that are no specific meanings. These parameters can be selected as destination parameters by any programmable parameters and the user can define these parameters' meanings.

2.18 Menu P18: Brake logic control

ID	Parameter name	Range	Step	Default	Change mode	Modbus register address
P18.01	Brake controller enable	0: off 1: on	1	0	Stop Only	0708H
P18.02	Brake release current threshold	0%～200%	1%	50%	Run&Stop	0709H
P18.03	Brake apply current threshold	0%～200%	1%	10%	Run&Stop	070AH
P18.04	Brake release frequency threshold	0.00Hz～20.00Hz	0.01Hz	1.00Hz	Run&Stop	070BH
P18.05	Brake apply frequency threshold	0.00Hz～20.00Hz	0.01Hz	2.00Hz	Run&Stop	070CH
P18.06	Pre-brake release delay	0.0s～25.0s	0.1s	1.0s	Run&Stop	070DH
P18.07	Post-brake release delay	0.0s～25.0s	0.1s	1.0s	Run&Stop	070EH
P18.08	Brake logic indicator	0: apply 1: release	1	Actual	Actual	070FH

Menu 18 Logic diagram

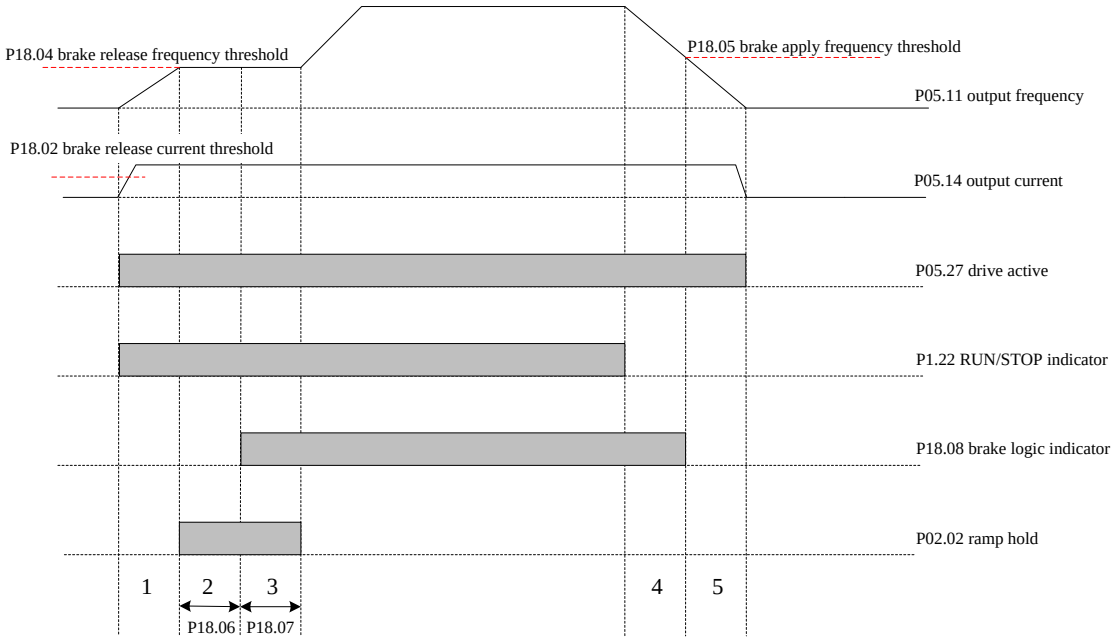


P18.01	Brake controller enable				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0: off 1: on				
Default	0				
Change mode	Stop Only				

The parameter is used to define the brake logic function is enabled or disabled.

0: the brake controller is disabled and the brake logic indicator (P18.08) is set to 0.

1: the brake controller is enabled and the brake logic indicator (P18.08) is set to 0 or 1 according to actual conditions. P18.08=0, brake apply; P18.08=1, brake release.



1. Wait for brake release current threshold and brake release frequency threshold
2. Pre-brake release delay
3. Post-brake release delay
4. Wait for brake apply frequency
5. Wait for zero frequency

Figure 2-18-1 Brake sequence

P18.02	Brake release current threshold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0%～200%				
Default	50%				
Change mode	Run&Stop				

The parameter defines the brake release current threshold. The value of the parameter is the upper threshold of hysteresis comparator. It is given as a percentage of motor rated current defined by P13.07 (or P13.09 if P13.03＝1 motor map 2 is selected).

P18.03	Brake apply current threshold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0%～200%				
Default	10%				
Change mode	Run&Stop				

The parameter defines the brake apply current threshold. The value of the parameter is the lower threshold of hysteresis comparator. It is given as a percentage of motor rated current defined by P13.07 (or P13.09 if P13.03＝1 motor map 2 is selected).

The output current (P05.14) is one of the judgement conditions of the brake logic. When the output current is above the current threshold defined by P18.02 the brake logic indicator will be set to 1 (brake release).

The output current (P05.14) is compared to an upper and lower threshold by a comparator with hysteresis to give torque present and drive output open detection functions respectively. When the output current is above the current threshold defined by P18.02, the output of the comparator is one. When the output current is below the current threshold defined by P08.03, the output of the comparator is zero.

The upper threshold (P18.02) should be set to the current level that indicates that there is magnetising current and sufficient torque producing current in the motor to deliver the required amount of torque when the brake is released. The output of the comparator remains active after this level has been reached unless the current subsequently falls below the lower threshold (P18.03) which should be set to the required level to detect the condition where the motor has been disconnected from the drive.

The two parameters must be set reasonably. If the value of P18.03 is set too small, the motor torque is insufficient to ensure the motor is in the safe state before the brake is applied If the lower threshold (P18.03) is set greater or equal to the upper threshold (P18.02), the upper threshold applies with a hysteresis band of zero. If P18.02 and P18.03 are both set to zero then the output of the comparator is always one.

P18.04	Brake release frequency threshold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～20.00Hz				
Default	1.00Hz				
Change mode	Run&Stop				

The frequency comparator can be used to detect when the motor frequency has reached a level (frequency defined by P18.04) where the motor can produce the required amount of torque to ensure that the motor rotates in the demanded direction when the brake is released. If P05.11≥P18.04, the output of the frequency comparator is one. The parameter indicates the brake release frequency that rises from zero. This parameter should be set to a level slightly above the motor slip frequency that is likely to occur under the highest expected load that is applied to the motor when the brake is released.

P18.05	Brake apply frequency threshold				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.00Hz～20.00Hz				
Default	2.00Hz				
Change mode	Run&Stop				

The brake apply frequency threshold is used to ensure that the brake is applied before the motor frequency reaches zero and to prevent the motor rotating (in the reverse direction due to an overhauling load for example) during the brake apply time. If the frequency falls below this threshold, but the motor is not required to stop (i.e. reversing direction without stopping), provided the reference on P01.22 (RUN/STOP indicator) remains at one, the brake is not applied. This prevents the brake from activating and de-activating as the motor passes through zero speed. Please refer to Menu 18 logic diagram. The relationship between the latch output port status and the input port or reset port status in the logic diagram as below:

- When the reset port status is one, the output port status will always be zero.
- When the reset port status is zero and the input port status is zero, the output port status is zero. When the reset port status is zero and the input port status is one, the output port status changes to one and latched. No matter what input port status at this moment the output port status holds one. Only when the reset port status changes to one the output port status returns to zero.

P18.06	Pre-brake release delay				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～25.0s				
Default	1.0s				
Change mode	Run&Stop				

The pre-brake release delay is used to allow time for the motor torque to reach the required level before the brake is released. This time should allow for the motor flux to reach a significant proportion of the rated level (2 or 3 times the rotor time constant of the motor), and the time for slip compensation to become fully active (at least 0.5s). During the Pre-brake delay period the frequency reference is held constant (P02.02 = 1).

P18.07	Post-brake release delay				
Coding	RW	US	PT	ND	PS
	■	■			
Range	0.0s～25.0s				
Default	1.0s				
Change mode	Run&Stop				

The post-brake release delay is used to allow for the brake release time. During this period the frequency reference is held constant (P02.02 = 1), so that there is no sudden increase in motor speed when the brake actually releases.

P18.08	Brake logic indicator				
Coding	RW	US	PT	ND	PS
			■	■	
Range	0: apply 1: release				
Change mode	Actual				

The parameter can be used as output source to control electronic mechanical braking equipments (such as electromagnetic valve). When the parameter is set to 1, release the brake. When the parameter is set to 0, apply the brake. Often use this parameter as a Relay control source.

2.19 Menu P19: Solutions Module set-up

The parameters are related with solutions module identification code. When the drive power up at the first time, only P19.01 .is visible

P19.01	**solutions module identification code**				
Coding	RW	US	PT	ND	PS
	■	■	■		
Range	0～255				
Default	0				
Change mode	Stop Only				

The Solutions Module ID indicates the type of module that is fitted in the slot.

Display code	**Corresponding module**
101	HDOM-Profibus-V0 module
201	HDOM-IO-Logic expansion card

The parameter will automatically identify the optional module that is fitted in the slot.

Please refer to the related module user manual about P19 parameters.

3 Options

These are HD700 options in the following table. Please select options according to the actual needs.

Table 3-1 HD700 options

Options	Function
LCD keypad (HDOM-LCD)	Used for operating drives, can display in Chinese and English.
Remote keypad (HDOM-RM-Keypad)	Used for remote operation, the farthest operation distance is 100 meters.
Keypad pallet (HDOM-PadFit)	Used for keypad installed. Connection between the drive and the keypad cannot be more than 10 meters.
Simple keypad pallet (HDOM-PadFit1)	
Communication adapter (HDOM-232)	Can realize the isolate transformation bi-directly between RS-232 and RS-485. HEDY drives can realize high speed data communication with computers through HDOM-232.
Communication adapter (HDOM-USB)	Can realize the isolate transformation bi-directly between USB and RS-485. HEDY drives can realize high speed data communication with computers through HDOM-USB.
Profibus module (HDOM-PROFIBUS-V0)	The HDOM-Profibus-V0 is a fieldbus Solutions Module that can be installed to the expansion slot in HD700 drives to provide PROFIBUS-DP slave connectivity.
PC testing software (HDSOFT (PCTools))	Interactive software (PC tools) between the computer and the drive, convenient and flexible debugging tools, can realize remote operation.
Input and output terminal expansion card (HDOM-IO-Logic)	Can expand the input and output terminals.

4 MODBUS communication

4.1 Communications port and wiring

Hardware interface of HD700 drive communication:

RJ45 port

Two terminals (A/RS484+, B/RS485−)

These two kinds of interface can play the same electric functions.

A serial communications link enables one or more drives to be used in a system controlled by a host controller such as a PLC or computer.

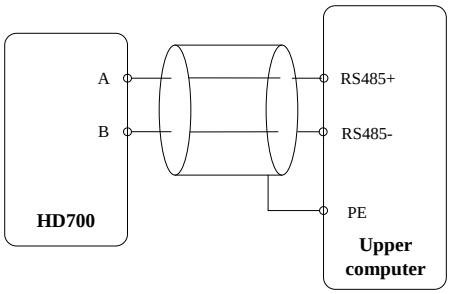


Figure 4-1-1 Communications link

NOTE: The RJ45 port pin as shown in figure 4-1-2, also can use parallel line.

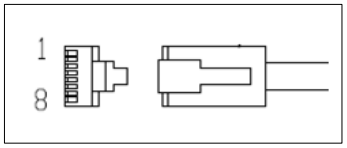


Figure 4-1-2 RJ45 port pin configuration diagram

Pin Number	Function
1	NC
2	A (485+)
3	0V
4	24V
5	NC
6	Enable
7	B (485−)
8	B (485−)

4.2 Communication mode

HD700 uses Modbus RTU, it supports to read/write normal registers. The frame has the following basic format:

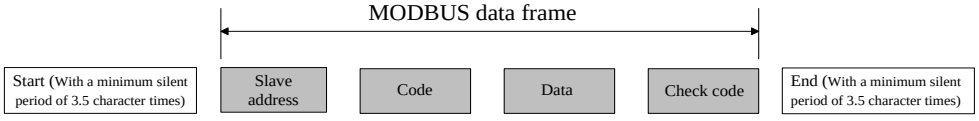

MODBUS data frame
Start (With a minimum silent period of 3.5 character times)
Slave address
Code
Data
Check code
End (With a minimum silent period of 3.5 character times)

Figure 4-2-1 Modbus RTU message format

Modbus RTU uses byte type of "big-endian" to state address and data (except the CRC, which is "little-endian"), sends high byte firstly, then low byte.

The frame is terminated with a minimum silent period of 3.5 character times at start and end. Use CRC-16 to check the message information.

- Function codes

  The function code determines the different requests.

Table 4-2-1 Function code

Code (Hex)	Description
03H	Read multiple registers
06H	Write single register, not save when power off
10H	Write multiple registers, not save when power off
17H	Read and write multiple registers, not save when power off

- Parameter mapping

  The mapping rules between parameter number and register address as below:

  Register address (hexadecimal): MNH

  M= decimal convert to hexadecimal from "m"

  N= decimal convert to hexadecimal from "n"

  "m" and "n" calculation is as below, use a parameter Px.y as the example,

  x.y*100=m*256+n+1

  For example:

  Modbus register address of parameter P04.01

  4.01×100=401=1×256+144+1

  Then

  m=1, n=144

  by the decimal to hexadecimal converting,

  M= 01, N=90,

  So, the Register address=0190H,

  Note: register addresses for all HD700 parameters are in the Appendix3.

- Function coed example 1 (03H)

  The example is to read the contents in P04.01～P04.10 of HD700 drive, details as below table:

Table 4-2-2 Code 03H example

Master Require							
Drive Node	Code	Start Register Address		Number Of Register Read		CRC Checking	
		MSB	LSB	MSB	LSB	LSB	MSB
01H	03H	01H	90H	00H	0AH	C4H	1CH

Slave (HD700 drive) Response									
Drive Node	Code	Number Of Register Read	Contents of P04.01～P04.10					Check Sum Of CRC	
			P04.01		……	P04.10		LSB	MSB
			MSB	LSB		MSB	LSB		
01H	03H	14H	01H	F4H	……	07H	D0H	B9H	76H

- Function coed example 2 (06H)

  The example is to write 8 into P03.27.

Table 4-2-3 Function code 06H example

Master Require							
Drive Node	Code	Register Address		Register Data		Check Sum Of CRC	
		MSB	LSB	MSB	LSB	LSB	MSB
01H	06H	01H	46H	00H	08H	68H	25H
Slave (HD700 drive) Response							
Drive Node	Code	Register Address		Register Data		Check Sum Of CRC	
		MSB	LSB	MSB	LSB	LSB	MSB
01H	06H	01H	46H	00H	08H	68H	25H

- Abnormal communication

  If the communication is abnormal, HD700 drive will turn back to the response frame, the format is in the below table

Table 4-2-4 Abnormal response format

Drive node	Code	Abnormal code	CRC checking sum	
1 bit	1 bit	1 bit	LSB	MSB

Table 4-2-5 Abnormal code description

Code	Description
81H	Not support the parameter
82H	Register address is beyond limit, the registers being read is too many
83H	The content of register is over limit

- CRC checking

  CRC is 16 bit cycle redundance checking, normally the standard CRC-16 is called: x16+x15+x2+1. Send the 16 bit CRC message to LSB, in a frame do the calculation of all bits.

```
const unsigned char auchCRCHi[] = {
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
    0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
    0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
    0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
    0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
    0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
    0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40,
    0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
    0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
    0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40,
    0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
    0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
    0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
```

```
        0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
        0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
        0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
        0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40,
        0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1,
        0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
        0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
        0x80, 0x41, 0x00, 0xC1, 0x81, 0x40
} ;
//Low-Order Byte Table
const char auchCRCLo[] = {
        0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06,
        0x07, 0xC7, 0x05, 0xC5, 0xC4, 0x04, 0xCC, 0x0C, 0x0D, 0xCD,
        0x0F, 0xCF, 0xCE, 0x0E, 0x0A, 0xCA, 0xCB, 0x0B, 0xC9, 0x09,
        0x08, 0xC8, 0xD8, 0x18, 0x19, 0xD9, 0x1B, 0xDB, 0xDA, 0x1A,
        0x1E, 0xDE, 0xDF, 0x1F, 0xDD, 0x1D, 0x1C, 0xDC, 0x14, 0xD4,
        0xD5, 0x15, 0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3,
        0x11, 0xD1, 0xD0, 0x10, 0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3,
        0xF2, 0x32, 0x36, 0xF6, 0xF7, 0x37, 0xF5, 0x35, 0x34, 0xF4,
        0x3C, 0xFC, 0xFD, 0x3D, 0xFF, 0x3F, 0x3E, 0xFE, 0xFA, 0x3A,
        0x3B, 0xFB, 0x39, 0xF9, 0xF8, 0x38, 0x28, 0xE8, 0xE9, 0x29,
        0xEB, 0x2B, 0x2A, 0xEA, 0xEE, 0x2E, 0x2F, 0xEF, 0x2D, 0xED,
        0xEC, 0x2C, 0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26,
        0x22, 0xE2, 0xE3, 0x23, 0xE1, 0x21, 0x20, 0xE0, 0xA0, 0x60,
        0x61, 0xA1, 0x63, 0xA3, 0xA2, 0x62, 0x66, 0xA6, 0xA7, 0x67,
        0xA5, 0x65, 0x64, 0xA4, 0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F,
        0x6E, 0xAE, 0xAA, 0x6A, 0x6B, 0xAB, 0x69, 0xA9, 0xA8, 0x68,
        0x78, 0xB8, 0xB9, 0x79, 0xBB, 0x7B, 0x7A, 0xBA, 0xBE, 0x7E,
        0x7F, 0xBF, 0x7D, 0xBD, 0xBC, 0x7C, 0xB4, 0x74, 0x75, 0xB5,
        0x77, 0xB7, 0xB6, 0x76, 0x72, 0xB2, 0xB3, 0x73, 0xB1, 0x71,
        0x70, 0xB0, 0x50, 0x90, 0x91, 0x51, 0x93, 0x53, 0x52, 0x92,
        0x96, 0x56, 0x57, 0x97, 0x55, 0x95, 0x94, 0x54, 0x9C, 0x5C,
        0x5D, 0x9D, 0x5F, 0x9F, 0x9E, 0x5E, 0x5A, 0x9A, 0x9B, 0x5B,
        0x99, 0x59, 0x58, 0x98, 0x88, 0x48, 0x49, 0x89, 0x4B, 0x8B,
        0x8A, 0x4A, 0x4E, 0x8E, 0x8F, 0x4F, 0x8D, 0x4D, 0x4C, 0x8C,
        0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42,
        0x43, 0x83, 0x41, 0x81, 0x80, 0x40
} ;
/*    CRC Generation for Modbus messages    */
// The function returns the CRC as a unsigned short type
unsigned short CCRC_ModbusRTUCRC16 (unsigned char *puchMsg, short usDataLen )
{
    unsigned short ReturnValue;
    // high byte of CRC initialized
```

```
    unsigned char uchCRCHi = 0xFF;
    // low byte of CRC initialized
    unsigned char uchCRCLo = 0xFF;
    // will index into CRC lookup table
    unsigned char uIndex;
    // pass through message buffer
    while (usDataLen--)     {
        // calculate the CRC
        uIndex       = uchCRCHi ^ *puchMsg++;
        uchCRCHi = uchCRCLo ^ auchCRCHi[ uIndex ];
        uchCRCLo = auchCRCLo[ uIndex ];
    }
    ReturnValue     = uchCRCHi;
    ReturnValue     <<= 8;
    ReturnValue       |= uchCRCLo;
    return ReturnValue;
}
```

- HD700 communication parameters

Table 4-2-6 HD700 communication parameters

ID	Function	Range	Default	Change Mode	Modbus Address
P00.03 (P10.07)	Control mode	0: Keypad 1: Control terminal 2: Comms.	0	Stop Only	0002H (03EEH)
P00.04 (P01.01)	Reference channel	0: Keypad 1: E-pot 2: Preset 3: AI1 4: AI2 5: Comms. 6: DI7 pulse 7: Fieldbus option 8: User programmed	0	Run&Stop	0003H (0064H)
P03.27	Comms. control word	0～65535	0	Run&Stop	0146H
P03.28	Comms. control word enable	0～1	0	Run&Stop	0147H
P10.02	Address	0～247	1	Run&Stop	03E9H
P10.03	Baud rate	0: 2.4KBPS 1: 4.8KBPS 2: 9.6KBPS 3: 19.2KBPS 4: 38.4KBPS 5: 57.6KBPS	3	Run&Stop	03EAH

ID	Function	Range	Default	Change Mode	Modbus Address
P10.04	Communication configuration	0: 1-8-1, RTU, no checking 1: 1-8-2, RTU, no checking 2: 1-8-1, RTU, odd checking 3: 1-8-1, RTU, even checking	1	Run&Stop	03EBH
P10.05	Response delay	0～250ms	2	Run&Stop	03ECH
P10.14	Drive status word	0～65535	Actual	Actual	03F5H

P03.27 and P03.28 provide a method of controlling the sequencer inputs and other functions directly from a single control word. If P03.28 = 0, the control word has no effect, if P03.28 = 1, the control word is enabled. Each bit of the control word corresponds to a sequencing bit or function as shown below,

Table 4-2-7 Control word (P03.27) description

Bit	Function
0	Drive enable
1	Run
2	3-wire enable
3	Run forward
4	Run reverse
5	FWD/REV
6	Jog forward
7	Jog reverse
8	Fault reset
9	Saving parameters
10	Clean the trip tack log
11	Enable comms. to write parameters
12	Reserved
13	Reserved
14	Reserved
15	Reserved

If P10.02 (drive address) = 0, the drive will not response the master.

Table 4-2-8 Drive status (P10.14) description

Bit	Function
0	Drive healthy
1	Drive is active
2	100% load
3	Frequency is arrived
4	Zero running
5	Running reverse
6	Current limit is working
7	Set time is meet
8	Drive control changed to by control terminal
9	Under voltage
10	Overload is calculating
11	Alarm
12	Length meets
13	Counting meets
14	PLC running is over

Bit	Function
15	PLC is working

- Scale definition
  - Frequency: 1:100

    If the drive reference is 50.00Hz, then for hex is 1388H.
  - Time rate: 1:10

    If the acceleration rate is 10.0s, then for comms. hex is 0064H.
  - Current rate: 1:10
  - Voltage rate: 1:1

    If the voltage is 380V, then for comms. hex is 017CH**.**

Appendix

Menu P00: Shortcut menu (quick commissioning)

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P00.01	Keypad cycle display mode (P05.02)	0: Fixed mode 1: Auto switch mode in running state 2: Reserved	1	0	Run&Stop	0000H
P00.02	Parameter display control (P05.03)	0: Only P00 parameters 1: All menu parameters 2: Only parameters which are different with the default setup	1	1	Run&Stop	0001H
P00.03	Control mode (P10.07)	0: Keypad 1: Control terminal 2: Comms.	1	0	Stop Only	0002H
P00.04	Reference source selector (P01.01)	0: Keypad 1: E-pot 2: Preset 3: AI1 4: AI2 5: Serial comms. 6: DI7 pulse 7: Optional card 8: User programmed	1	0	Run&Stop	0003H
P00.05	AI1 mode selector (P08.02)	0: 0mA～20mA 1: 20 mA～0mA 2: 4mA～20mA (current loosing with trip) 3: 20mA～4mA (current loosing with trip) 4: 4mA～20mA (current loosing without trip) 5: 20mA～4mA (current loosing without trip) 6: 0V～10V	1	6	Stop Only	0004H
P00.06	Preset1 (P04.01)	Min. frequency～300.0Hz	0.01Hz	5.00Hz	Run&Stop	0005H

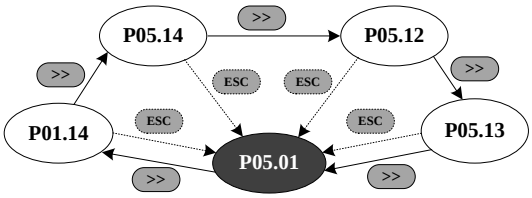
ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P00.07	Max. frequency (P01.02)	0.00Hz～300.0Hz	0.01Hz	50.00Hz	Stop Only	0006H
P00.08	Min. frequency (P01.03)	0.00Hz～Max. frequency	0.01Hz	0.00Hz	Stop Only	0007H
P00.09	Accel. rate1 (P02.04)	0.0～3600.0	0.1	10.0	Run&Stop	0008H
P00.10	Decel. rate1 (P02.05)	0.0～3600.0	0.1	20.0	Run&Stop	0009H
P00.11	Stop mode (P03.10)	0: Ramp 1: Coast 2: Ramp+ DC injection 3: Ramp +coast	1	0	Stop Only	000AH
P00.12	Power up Keypad reference (P01.11)	0: 0.00Hz 1: The running frequency when last powered off 2: Preset 1	1	0	Run&Stop	000BH
P00.13	Motor1 rated voltage (P13.06)	0V～240V 0V～480V 0V～690V	1V	200V: 220V 400V: 380V 690V: 660V	Stop Only	000CH
P00.14	Motor1 rated current (P13.07)	G or P type: 0.1A～rated current×1.2 GP type: 0.1A～P type rated current	0.1A	By model	Stop Only	000DH
P00.15	Motor1 rated frequency (P13.08)	1.00Hz～300.0Hz	0.01Hz	50.00Hz	Stop Only	000EH
P00.16	Motor1 rated speed (P13.10)	1rpm～18000rpm	1rpm	0rpm	Stop Only	000FH
P00.17	Auto-tune (P13.02)	0: No action 1: Static Auto-tune1 2: Static Auto-tune2 3: Reserved	1	0	Stop Only	0010H
P00.18	Motor1 stator resistance (P13.11)	0.000Ω～60.000Ω	0.001Ω	0	Stop Only	0011H
P00.19	Motor1 Power factor (P13.05)	0.00～1.00	0.01	0.85	Stop Only	0012H
P00.20	Motor voltage control mode (P13.01)	0: V/F 1: Open loop vector control	1	0	Stop Only	0013H
P00.21	Switch frequency (P10.10)	1kHz～15kHz	1kHz	By model	Run&Stop	0014H

ID	Function	Range	Step	Default	Change Mode	Modbus Register Address
P00.22	Voltage boost (P06.08)	0.0%～30.0%	0.1%	By model	Run&Stop	0015H
P00.23	V/F mode (P06.01)	0: User define V/F 1: 2 law 2: 1.7 law 3: 1.2 law	1	0	Stop Only	0016H
P00.24	Load default (P10.08)	0: No action 1: Load default	1	0	Stop Only	0017H

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.01 (P05.02)	Keypad cycle display mode	0～2【1】	Run&Stop

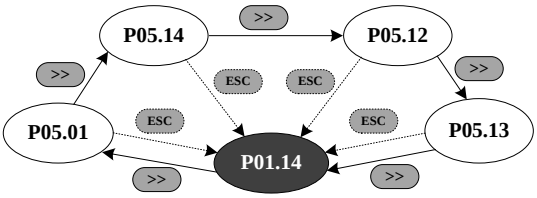
0: Fixed mode

Keypad cycle display order: on standby or running state, the order of keypad cycle display will not be changed.



1: Auto switch mode in running state

Keypad cycle display order: the order as shown in the figure below when the drive is on standby; when the drive is running, it will automatically switch to the circular order of fixed mode.



2: Reserved

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.02 (P05.03)	Parameter display selection	0～2【1】	Stop Only

0: Only menu P00

1: All menus

2: Only parameters which have different value with the defaults set

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.03 (P10.07)	Control Mode	0～2【0】	Stop Only

0: Keypad

1: Terminal

2: Serial comms.

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.04 (P01.01)	Reference source selector	0～8【0】	Run&Stop

0: Keypad

Through adjusting ▲ or ▼ switches to change the frequency reference, and the Power up value is decided by parameter P00.12 (P01.11).

1: E-Pot

Through the two terminals which are defined as UP, DOWN function to change the reference.

For example:

Define the DI4 and DI5 as UP and DOWN function, and the setup is as below:

P09.05=8 DI4 function is UP

P09.06=9 DI5 function is DOWN

2: Preset

Controlled by terminals, the reference is the value of P04.01 (preset 1) ～P04.16 (preset 16).

Use the default setup as an example:

P09.05=0 DI4 is preset select bit 0

P09.06=1 DI5 is preset select bit 1

There are tow operation modes:

- When the reference source is preset, terminal status as shown below:

Table 1 Preset and preset terminal status corresponding table 1

DI5 Status (bit 1)	DI4 Status (bit 0)	Speed
OFF	OFF	Preset 1 (P04.01)
OFF	ON	Preset 2 (P04.02)
ON	OFF	Preset 3 (P04.03)
ON	ON	Preset 4 (P04.04)

- When the reference source is not preset, terminal status as shown below:

Table 2 Preset and preset terminal status corresponding table 2

DI5 Status (bit 1)	DI4 Status (bit 0)	Speed
OFF	OFF	Keep the frequency setting
OFF	ON	Preset 2 (P04.02)
ON	OFF	Preset 3 (P04.03)
ON	ON	Preset 4 (P04.04)

About 16 presets (P04.01～P04.16) control, please refer to Menu P04.

3: AI1

There are two analogue input terminals: AI1, AI2.

In this User manual, only AI1 is introduced.

According to parameter P08.03, AI1has three functions:

P08.03=0, AI1 is speed reference

P08.03=1, AI1 is the speed limit under Torque control mode

P08.03=2, AI1 is the Torque error

About AI1 signal mode, there are current mode and voltage mode, details please refer to the explanation of parameter P00.05 (P08.02).

4: AI2

AI2 function is decided by the parameter P08.08, it is same with AI1, and the default function is frequency reference.

AI2 has only voltage mode.

AI2 detail setup please refer to Menu P08

5: Serial comms.

Under this mode, user can change the value of P04.01 (Preset 1) for the reference. Details please refer to the appendix1.

6: DI7 Pulse input

When P09.24=2, DI7 function is reference channel (by input pulse)

For example:

The maximum frequency of input pulse (P09.27) is 20.0kHz, actual input pulse is 10.0kHz.

The percentage of DI7 pulse input (P09.38) is 50.0%. Then the reference is:

Reference = DI7 input percentage (P09.38) ×maximum reference (P00.07)

= 50.0%×50.00Hz

= 25.00Hz

7: Optional card (By option modules)

8: User program

By destination and source control, user can define the reference channel freely. For example through Menu P17, user can define the reference source. About actual application guide, please refer to the ***HD700 Advanced User Manual***.

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.05 (P08.02)	AI1 mode selector	0～6【6】	Stop Only

AI1 signal can be voltage or current mode.

0: 0mA～20mA

1: 20mA～0mA

2: 4mA～20mA (current loosing with trip)

3: 20mA～4mA (current loosing with trip)

4: 4 mA～20mA (current loosing without trip)

5: 20mA～4mA (current loosing without trip)

6: 0V～10V

When the AI mode selection is "0～5", if the input current is over 26mA, the drive will trip at F012, the drive will stop as the mode decided by P03.10, then turn off the IGBTs.

When this parameter is set to 2 or 3, if the input current is less than 3mA, then the drive will trip at F013, the drive will stop as the mode decided by P03.10, then turn off the IGBTs.

NOTE: If the selection is "2～5", once the current is less than 3mA, P08.16 (current loosing indicator) is 1.

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.06 (P04.01)	Preset 1	±Max. reference【5.00】	Run&Stop

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.07 (P01.02)	Max. reference	0.00Hz～300.0Hz【50.00】	Stop Only
P00.08 (P01.03)	Min. reference	0.00Hz～max. reference【0.00】	Stop Only

If P03.01=0 (reverse is enabled), then the P00.08 is fixed at 0.00Hz.

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.09 (P02.04)	Acceleration rate 1	0.0s～3600.0s【10.0】	Run&Stop
P00.10 (P02.05)	Deceleration rate 1	0.0s～3600.0s【20.0】	Run&Stop

Acceleration rate is the time from 0Hz to maximum reference.

Deceleration rate is the time from maximum reference to 0Hz.

For example:

P00.07 (P01.02) = 100.00Hz, set up the maximum reference

P00.09 (P02.04) = 10.0s

After starting, the drive output frequency is from 0.00Hz ramp to 50.00Hz and the acceleration rate is: 10.0s × (50.00Hz/100.00Hz) = 5.0s

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.11 (P03.10)	Stop mode	0～3【0】	Stop Only

0: Ramp stop

1: Coasting

2: Ramp +DC injection

3: Coasting +DC injection

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.12 (P01.11)	Keypad power up reference	0～2【0】	Run&Stop

When the reference source is keypad, the reference when powered up is decided as below:

0: Starting reference is "0"

1: Starting reference is the output frequency before powered off

2: Starting reference is preset1 (P04.01)

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.13 (P13.06)	Motor1 rated voltage	200V: 0V～240V【220V】 400V: 0V～480V【380V】 690V: 0V～690V【660V】	Stop Only
P00.14 (P13.07)	Motor1 rated current	G or P type: 0.1A～rated current×1.2 GP type: 0.1A～P type rated current【by model】	Stop Only
P00.15 (P13.08)	Motor1 rated frequency	1.00Hz～300.0Hz【50.00】	Stop Only
P00.16 (P13.10)	Motor1 rated RPM	1rpm～18000rpm【0】	Stop Only
P00.17 (P13.02)	Autotune selector	0～3【0】	Stop Only

0: No action

1: Static autotune1 (first run)

When P00.17=1, press PRG make sure the change and return the ready stage, once there is a run order, the drive will do the static auto-tune, after finished, P00.17=0, and the drive will be at ready status.

2: Static autotune2 (every run)

When P0.17=2, every run order received, the drive will do the autotune, after the static autotune, save the result into the EEPROM, and P0.17=2, and the drive is running.

3: Reserved

NOTE: If the auto-tune is working without load motor, the drive will trip at F016.

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.18 (P13.11)	Motor1 stator resistance	0.000～60.000Ω【0】	Stop Only

After auto-tune finished, this parameter will be updated. If the resistance value is out of the range, trip F016 will happen.

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.19 (P13.05)	Motor1 power factor	0.00～1.00【0.85】	Stop Only

PF and motor rated current (P00.14) are used to calculate the motor torque current and magnetizing current.

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.20 (P13.01)	Motor voltage control mode	0～1【0】	Stop Only

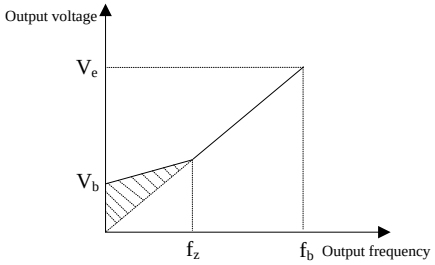
0: V/F control

1: Open loop vector control

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.21 (P10.10)	Switch frequency	1kHz～15kHz【by model】	Run&Stop

Switch frequency can affect the motor noise and drive power loss, higher switch frequency, lower motor noise but bigger IGBT power loss.

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.22 (P06.08)	Voltage boost level	0.0%～30.0%【by model】	Run&Stop



V_e: motor rated voltage

V_b: Boost voltage=Ve×P00.22

f_z: boost close frequency (P06.09)

f_b: rated frequency

Figure 4-1 Voltage boost

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.23 (P06.01)	V/F mode setup	0～3【0】	Stop Only

Different V/F characteristic is defined by P00.23 to meet the demanding from different load.

There are three kinds of fixed curve and one user programmed line

When P00.23 (P06.01) is 0, user can define the different fold lines by the setting of P06.02～P06.07, add (V1, F1)、 (V2, F2)、 (V3, F3) three points to define the V/F lines mode.

- The default V/F is a straight line, as the line 0 in Figure 4-2.
- When P00.23 (P06.01) is set to 1, it is a 2.0 law ramp, curve 1 in figure 4-2.
- When P00.23 (P06.01) is set to 2, it is a 1.7 law ramp, curve 2 in figure 4-2.
- When P00.23 (P06.01) is set to 3, it is a 1.2 law ramp, curve 3 in figure 4-2.

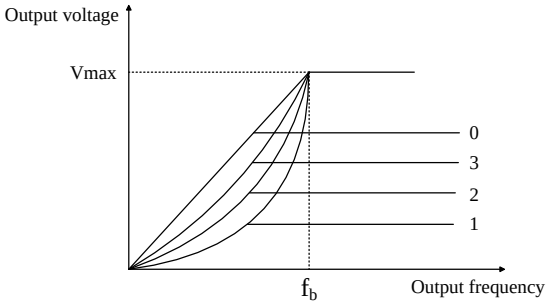


Figure 4-2 Motor V/F curve

Parameter ID	Parameter Name	Range【Default】	Change Mode
P00.24 (P10.08)	Load default	0～1【0】	Stop Only

0: No action

1: Load default

When P00.24=1, and press PRG switch, parameters are loaded default setup and save into the EEPROM, P00.24=0.

NOTE:

- After loading default, except motor parameters, all other parameters are recovered to factory setup;
- After loading default, P00.01 is 0, means User Code is disable;
- Recommend to upload the parameter setup to the keypad's EEPROM before loading default.

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